



FRIDAY, OCTOBER 29, 1897.

CONTENTS

ILLUSTRATIONS:	PAGE.	GENERAL NEWS:	PAGE.
Special Mountain Engine for the Mexican Central	737	Car Building	772
New Box Cars for the Big Four	760	Bridge Building	772
A Large Multiple Boring Machine	760	Meetings and Announcements	772
Black Diamond Body Bolster	761	Railroad Law	773
New Compressed Air Mining Locomotive	762	Personalities	773
Ten Wheel Freight Engine—Chicago & North-western	762	Elections and Appointments	774
Application of Electricity to Steam Railroads	763	Railroad Construction	774
The Ova. Brakebeam	769	Electric Railroad Construction	775
CONTRIBUTIONS:		General Railroad News	775
Large Railroad Generators	737	Electric Railroad News	776
The Roaring of Brick Pavements	757	Traffic	776
EDITORIALS:		MISCELLANEOUS:	
The Accident on the Hudson River Railroad	766	Technical	770
Some Notes on a Butting Collision	766	The Scrap Heap	771
September Accidents	767	The Garrison's Train Accident	757
Norwegian Railroads	767	American Street Railway Association	757
EDITORIAL NOTES	767	Train Accidents in the United States in September	761
New Publications	768	Municipal Ownership and Operation of Street Railroads	765
Trade Catalogues	769	Record Discipline on the Erie	769
GENERAL NEWS:		The G. P. A.'s Other Side	769
Locomotive Building	772	Exhibits at the Niagara Falls Meeting, A. S. R. A.	769

Contributions.

Large Railroad Generators.

NEW YORK, Oct. 18.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Oct. 14 appears a letter signed S. H. Short. There are one or two statements in his letter which look to me as if he were laboring under a misapprehension, although this would be hard to explain in the case of one so well posted as he. He says: "In this country we have installed the largest street railway generator ever built. This generator is of 1,500 KW. capacity." It cannot be unknown to Mr. Short that the generator installed in the Intramural power-house at the Chicago World's Fair, and built by the General Electric Co., was one of 1,500 KW.; that four machines of similar capacity, and built by the same company, have been in operation in the Kent avenue power-house of the Brooklyn City Railway for over three years, and that others have been operating in different parts of the country for nearly as long, and that generators of 1,600 KW. capacity have been furnished by the General Electric Co. for nearly two years. Some of these are in operation at Boston, and one in the station of the Consolidated Traction Co., at Newark.

J. MCGHIE.

The Roaring of Brick Pavements.

NIAGARA FALLS, N. Y., Oct. 18, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the contributed article by C. F. M., on the subject of "Expansion of Brick Roofs and Pavements," in your issue of Oct. 8, reference is made to trouble with brick pavement in this city. A few facts relating to the trouble in question may prove of interest to some of your readers.

Since the introduction of brick pavements in this city there have been several cases of upheaval of the pavement and a number of cases of "the hollow sound or roar" under travel. Where such trouble has occurred the pavement had been laid in cold weather and the joints filled with Portland cement grout.

I examined closely the last upheaval, which occurred upon the hottest day of the summer just passed, and found conclusive evidence that expansion of the brick had taken place and was the whole cause of the rupture. The break occurred at a street intersection between the curb line and the outside rail of the street car track. About noon-time the brick pavement suddenly buckled or raised from its bed, forming an arch about 5 ft. wide and 10 ft. long, with a rise of 10 to 12 in., the longitudinal axis of the arch being normal to the line of the main street. The cushion of sand remained undisturbed. Along the curb from the street corners, for some distance, a crack appeared, greater at the curved corner, indicating a movement of the pavement from both directions toward the upheaval.

This pavement was laid in November and December of 1894 and the trouble with it began in the first warm weather of the spring following, the failure above described being the most serious.

I have also examined a number of cases of the reverberation of brick pavements and found the existence of an air space between the brick and the cushion sand to be the primary cause in every instance. This air space may be the result of (1) the arching of the brick during hot weather, due to its expansion, or (2) to the settling of the foundation in soft ground or over a trench which had been refilled just previous to the construction of the pavement, and (3) to the settling of the cushion sand after the completion of the pavement. When caused by

(1) the reverberation will be most noticeable in hot weather, when by (2) or (3) it will probably be noticed both winter and summer.

My conclusions as to the cause of number (3) are that the sand was either frozen or very wet when the bricks were laid upon it, or it was not properly rolled before grouting the brick joint and the settling of the sand took place when it thawed or dried out.

From my experience in the construction of brick pavements and from examinations of cases of failure, it is my opinion that such failures are almost always due to faulty construction, and I agree fully with C. F. M. in his conclusions that when brick pavement is laid in cool weather proper allowance must be made for the expansion of the brick, especially when the joints are filled with cement grout. Niagara Falls has one street paved with brick having the joints filled with asphalt, which has passed through the hot weather without giving any trouble whatever.

The theory of exploding gas as the cause of upheaval in brick pavement may have its foundation in one or two isolated cases, but if prompt and close examinations were to be made when failures occur, I believe that the expansion of the brick would be found to be the true secret of the trouble in nearly every case.

WALTER MCCULLOCH.

The Garrison's Train Accident.

On Sunday, Oct. 24, about 5:50 a. m., southbound passenger train No. 46 of the New York Central & Hudson River road, running at full speed, was derailed about two miles south of Garrison's, N. Y., on the Hudson Division, and the engine and five cars fell into the Hudson River. Seventeen passengers, the engineman, the fireman and an employee of the road riding on the engine, were drowned, and seven passengers and one trainman were injured. The cause of the derailment appears to have been the caving in of the roadbed, though precise information on this point is not yet at hand. A large mass of earth slid into the river, but the nature of the defect is obscure.

The engine sank in about 40 ft. of water, about 30 ft. away from the track. The second car was a day coach and all the passengers drowned were in this car. It was quickly submerged so far that little more than the roof was visible above the water, and the few survivors in the car hung to the clear-story windows and other fixtures until rescuers from the shore succeeded in cutting holes in the roof. There were six sleeping cars in the train, three of which remained on the track. The other three were partially submerged, and the passengers' clothing, baggage and money were not secured until the cars were raised, but the passengers got out through the windows in safety. An express car floated down stream about 1½ miles.

The track at the place of the accident rests on an embankment built at the edge of the river, the ground rising abruptly on the east side. On the west side, that next to the water, there is a wall to protect the road from the wash of the river. The railroad was built, under the direction of John B. Jervis, in 1848, and it is said that this wall has stood intact since that time.

On Monday the General Roadmaster of the company said to a reporter: "The report that the road had been widened recently is untrue. The work consisted not of widening the bed out toward the river, but of raising the surface of the bed. We did not change the alignment of the tracks in any way. Raising the bed, however, naturally necessitated the raising of the seawall. We built the new wall on top of the old wall, using the old wall as a foundation. The alignment of the old wall was not changed in any particular. Its top came in some places above the surface of the water, in others it was just below the surface. The new wall on top of the old one was simply a piece of masonry above the water, and its giving way would not have occasioned any such accident as occurred. I should say that at some points along the line where we were raising the roadbed we found the old seawall slightly bulged out. It had been forced out by the pressure of the filling in. The bulging, however, was only noticeable near the top of the old seawall. Further down, near the foundation, it had not moved an inch from the position in which it was originally laid, and consequently the bulging was of no consequence whatever."

American Street Railway Association.

The meeting of the Street Railway Association, held at Niagara Falls last week, and partially reported in our last issue, deserves more than the short account already given. The subjects of the papers read at the meeting were selected with more than the usual care and their treatment was full. To the steam railroad man the paper on "Application of Electricity to Railroads now Operated by Steam Power," written by Col. H. M. Heft, of the New York, New Haven & Hartford Railroad, will doubtless prove the most interesting and instructive, inasmuch as it contains some figures and facts heretofore known only in a general way. It is to be regretted that the papers did not call forth more general discussion from the members of the association.

Many regard the exhibits as the principal feature of the gathering, and probably that is so in a large measure. Those not attending this or a similar convention can little imagine the interest shown in the display made by the supplymen, or of the expense and labor

necessary to make it the success that it is. There is, however, one thing in this connection to which attention should be called. An injustice is done to many who occupy spaces near an exhibit where motors, brakes, wheel grinders and other heavy machines are shown in operation. Such machines should be located in some place other than the main exhibit hall. While this may have its disadvantages it will doubtless meet the approval of a large majority. The completed list of exhibits will be found elsewhere in this issue.

The trip through the Great Gorge, the visits to the new industries springing up near the Falls and to the 15,000 H. P. power station were enjoyed by those in attendance during the hours not spent at Convention Hall. At the latter place work is now being pushed in the preparation of five (5,000 H. P. each) new turbines and generators. These will be, in the main, similar to those already in place, but modified in some details by Dr. Coleman Sellers, who has direct supervision of the work. The banquet held Thursday evening, with its happy responses, was a fitting close of this very enjoyable gathering.

Mr. Frank R. Ford, a delegate from the American Street Railway Association to the National Conference on standard electrical rules, stated that on Dec. 11 and 12, 1896, the Committee on Code adopted its final report, and that all the associations represented had adopted or approved of the rules as formulated with the exception of the American Society of Mechanical Engineers and the American Street Railway Association. At the December meeting of the former society the question will come up for action, and it was advisable that immediate action should be taken by the association. On motion, the code as finally revised was adopted. The new code contains many desirable amendments as to the technical requirements, and the old one has been revised so as to obtain a more logical arrangement. While it is not claimed that the code is perfect, yet it can be said that each term used has been carefully considered by the men representing the different societies, and instead of the number of sets of electrical rules governing construction throughout the country the new code will be recognized as the one set of rules to which all electrical work must conform.

At the business session on Thursday a number of interesting and important subjects were discussed. It was decided to limit the time in which the annual meeting should be held from Sept. 15 to Dec. 15. Mr. C. N. Duffy, of St. Louis, called attention to the work of the Street Railway Accountants' Association and thanked the Street Railway Association for its interest and help in the work of the new organization. The report of the committee, composed of Messrs. W. F. Kelly, Ira A. McCormick and E. C. Foster, appointed at the St. Louis meeting to consider the advisability of adopting a code of rules for the government of street railroad employees, then reported that it seemed both necessary and desirable that a standard code should be adopted. The Committee was authorized to draw up such rules and present them at the next meeting of the Association for approval. It was stated by the Committee in its report that if such a standard be adopted it should be left entirely to the discretion of the individual members as to whether they should use it on their own roads.

Mr. W. S. Dimmock, of the Omaha & Council Bluffs Railway and Bridge Co., then called attention to the necessity of considering the question of street car companies carrying mail, and of the importance of urging the government to make favorable contracts with the street railroads for such service. In the discussion which followed it appeared that in some cities little advance had been made in this direction, while in others the government officials and the street railroad companies had made amicable agreement whereby not only the rate for carrying the mails was as high as that paid for steam roads, but the amount carried had been increased from time to time.

At the session held Friday morning the customary vote of thanks was extended to all who had in any way made the meeting at Niagara Falls both pleasant and interesting, and this was followed by the installation of the new officers, which are as follows: President, Albion E. Lang, of Toledo, O.; First Vice President, W. Cary Ely, Niagara Falls, N. Y.; Second Vice-President, John A. Rig, Reading, Pa.; Third Vice-President, Edward G. Connette, of Nashville, Tenn.; Secretary and Treasurer, T. C. Penington, Chicago, Ill. Executive Committee—Robert McCulloch, St. Louis, Mo.; C. Wyman, New Orleans, La.; Henry C. Moore, Trenton, N. J.; John M. Roach, Chicago, Ill., and Robert S. Goff, Fall River, Mass.

After a few timely remarks by the new President, the meeting adjourned to convene at Boston in 1898 on such dates as may hereafter be designated by the Executive Committee.

Special Mountain Freight Engine for the Mexican Central Railway.

The Brooks Locomotive Works has completed a special mountain freight locomotive for the Mexican Central Railway, which, beside being the largest engine turned out at this works, has a number of interesting features which are shown by the engravings. So far only one engine of this design has been ordered.

Fig. 1, from a photograph, shows the appearance of the engine, which has four-coupled driving wheels and a leading and trailing truck, permitting the engine to be run about equally well in either direction. We are informed by the designer, Mr. F. W. Johnstone, Superin-

tendent of Motive Power of the Mexican Central, that the driving wheel base was made as short as possible on account of the numerous curves on that portion of the road where the engine will be used. This engine was designed to haul trains of 210 gross tons up a three per cent. grade 30 miles in length, where there are many curves as sharp as 18 deg. The total weight of train, including the engine and tender, will be between 350 and 355 tons.

Fig. 2 is an elevation, and Fig. 3 sections of the engine at various points. These engravings show in general the principal features of the construction; the details of the boiler are given by Fig. 4.

This engine is expected to burn either wood or bituminous coal. The cylinders are 21 in. in diameter by 26 in. stroke, and the driving wheels are 49 in. in diameter. The total weight in working order is 193,450 lbs., of which 145,200 lbs. is on the drivers, 23,450 lbs. on the front truck and 24,800 lbs. on the rear truck wheels. The driving wheel base is 13 ft., the total wheel base of the engine is 28 ft. 2 in., the length of the engine over all is 36 ft. 6 $\frac{3}{4}$ in., while the length of the engine and tender over all is 61 ft. 4 $\frac{1}{4}$ in.

The boiler is of the Player improved Belpaire type, of steel, and carries a working steam pressure of 180 lbs. per square inch. The thickness of the sheets in the first course is $\frac{5}{16}$ in., and in the second course $\frac{3}{16}$ in.; the side and top sheets of the boiler, as also the back head, are $\frac{5}{16}$ in. thick. The front tubesheet is $\frac{3}{4}$ in. thick, and the firebox tubesheet is $\frac{5}{8}$ in. The method of direct staying used represents the latest practice of the Brooks Locomotive Works, where high steam pressures are carried,

The heating surface of the firebox is 218 sq. ft., that of the tubes 2,585 sq. ft., making a total heating surface of 2,803 sq. ft. The grate area is 31.45 sq. ft.

The diameter of the smoke box is 81 in., and on account

Fig. 5 shows the details of the front end of the loco motive frame, and the method of fastening the cylinder casting. It will be noted that the frame is 5 in. wide throughout, excepting at the extreme forward end

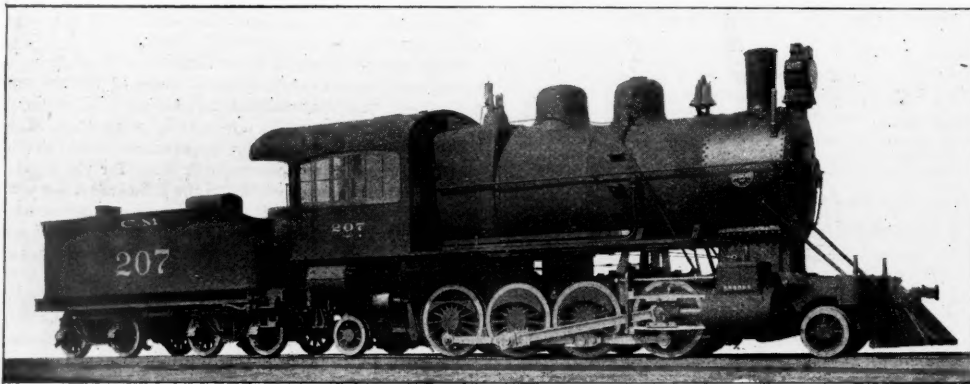


Fig. 1.—Special Mountain Engine for the Mexican Central.

of its large size a portion of the stack projects inside the front end. A square box netting is used with a short exhaust pipe and draft tube inside the netting.

The tender loaded weighs 90,000 lbs. and has four-wheel metal trucks of the standard Mexican Central type, as illustrated in the *Railroad Gazette* June 4 last.

where it is reduced to 4 in. Fig. 6 likewise gives the details of the cylinder and saddle casting and the dimensions of the steam and exhaust passages.

The cab and running boards are of steel, as is the usual practice of this road. The cab has unusually large side windows. Especial attention has been given to the ar

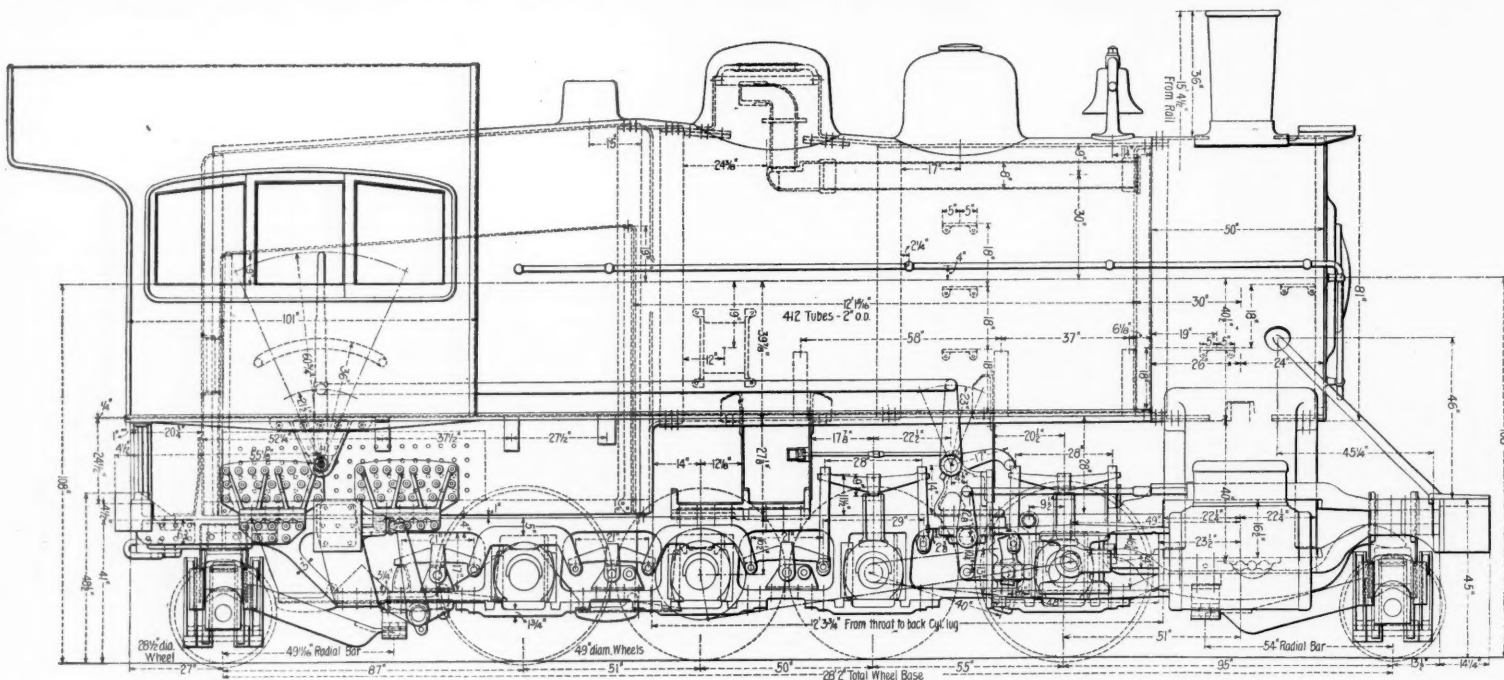


Fig. 2.—Special Mountain Locomotive—Mexican Central Railway.

Designed by Mr. F. W. JOHNSTONE, Superintendent of Motive Power.

Built by the BROOKS LOCOMOTIVE WORKS, Dunkirk, N. Y.

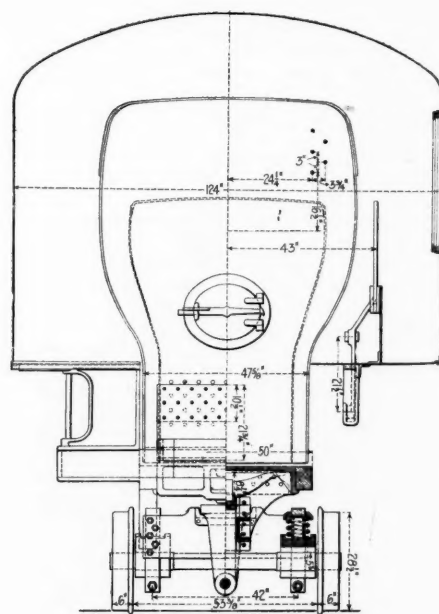
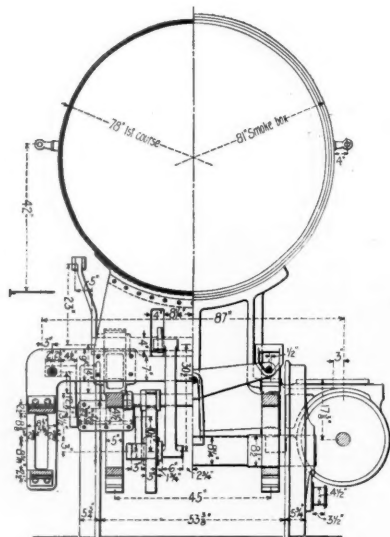
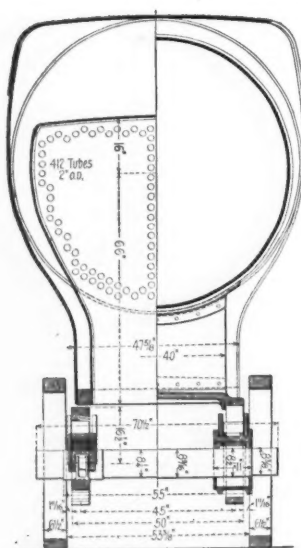


Fig. 3.—Sections Through Mexican Central Locomotive.

and is clearly shown by Fig. 4. The outside diameter of the barrel is 78 in. There are 412 tubes 2 in. in diameter and 12 ft. 1 $\frac{1}{2}$ in. long.

The firebox is above the frames and is made of steel. It is 10 ft. 1 in. long and 3 ft. 2 $\frac{3}{4}$ in. wide inside the mud ring. The depth at the front is 82 in. and at the back 75 in. The crown sheet is $\frac{7}{8}$ in. and the side and door sheets are $\frac{5}{8}$ in. thick.

The underframe is formed of 9-in. steel channels, and the tender has a capacity for 4,500 gallons of water and five tons of coal.

Cast steel is used for the front and back couplers, cylinder heads, pistons, steam chests and covers, driving boxes and driving wheel centers, while malleable iron is used for the locomotive steam pipes, and for the center castings, side bearings, truck boxes and lids of the tender.

range of the cab fittings, so as to be most convenient to the men. The engineman and fireman have drop seats. Directly in front of the engineman, near the floor, is the cylinder cock lever, while bolted to the right side of the cab are the engineer's brake valve and air signal whistle. The reverse lever is on his left, while above and attached to the side of the boiler are the levers to the throttle valve, sand box and whistle. There

is also a similar whistle lever on the fireman's side. Steam and air gages are mounted on a bracket attached to the side of the boiler at such an angle that the faces of the gages are directly in front of the engineer, the fireman's steam gage being in the center, attached to the

single locomotive yet built. The total weight on the drivers is less than that of the twelve-wheel engines of the Northern Pacific, and also the decapods of the Burlington & Missouri River, the St. Clair Tunnel and the New York, Lake Erie & Western. It should also be

wheels. These consolidation engines are expected to have a total weight of about 192,000 lbs., 56-in. driving wheels, cylinders 22 in. x 28 in., a boiler 72 in. in diameter at the first cylinder course and carry a working steam pressure of 210 lbs.

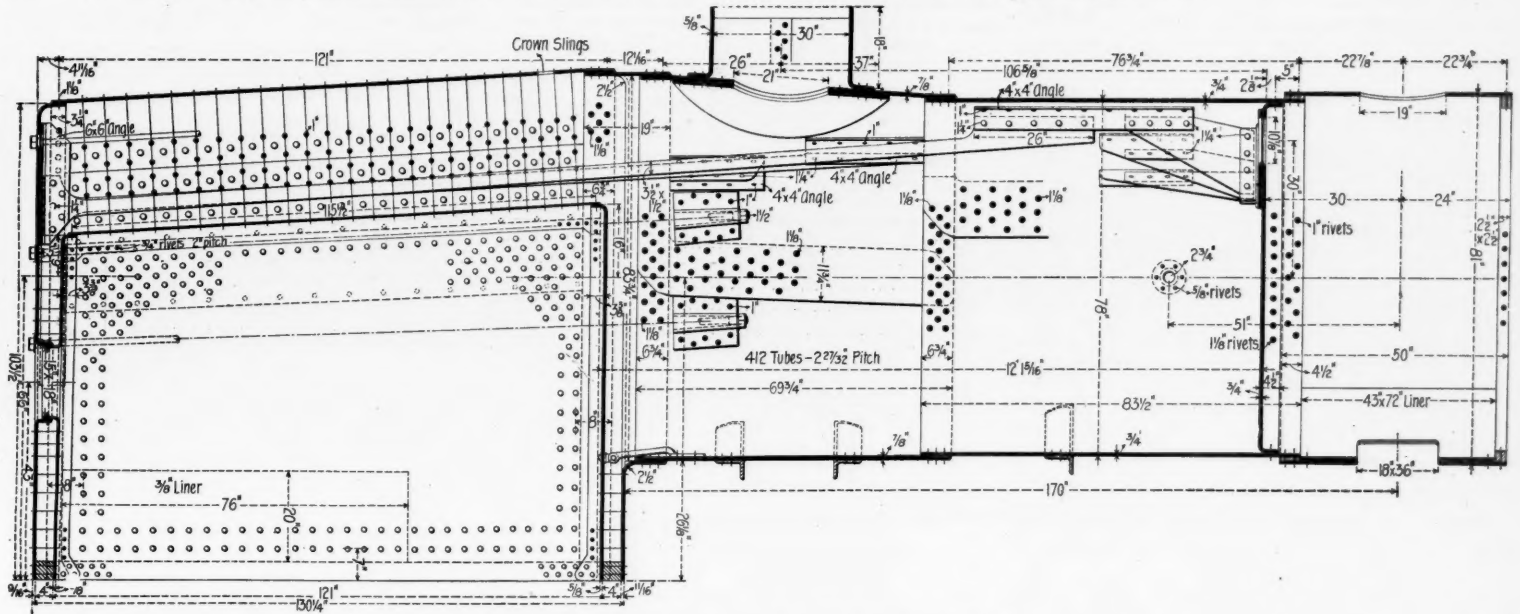
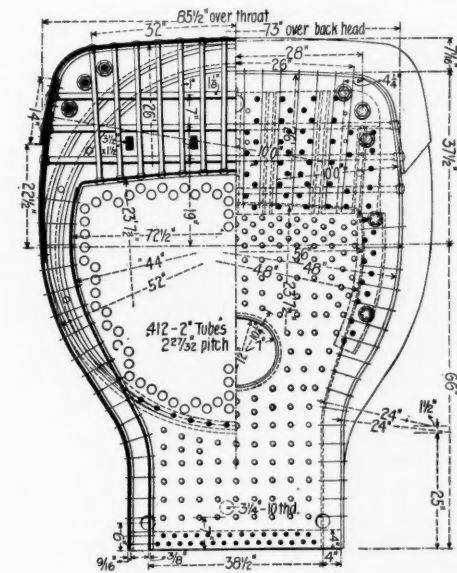


Fig. 4.—Boiler of Brooks Locomotive—Mexican Central Railway.



Details of Boiler.

back head of the boiler. The lubricators are on the back head of the boiler on the engineer's side, and directly below the lubricators are four gage cocks and the water glass. The valves for admitting steam to the blower and to the air pump are low down on the back head of the boiler within easy reach. The injectors, one on either side, are below the cab on a level with the top of the frames, the starting rods projecting through the cab floor back of the engineman's and fireman's seats respectively. The main air reservoirs, one on either side, are below the cab and above the rear trailing wheels, while the auxiliary reservoir and triple valve is above the rear driver on the engineman's side and below the running board.

The following table of principal dimensions compiled from our records is of interest in showing the relative size of the new Mexican Central engine as compared

noted that on account of the arrangement and size of the driving wheels, the driving wheel base of the Mexican Central engine is less than that of the others shown in the table. The Mexican Central engine appears to stand sec-

Other general dimensions of the Mexican Central locomotive are as follows:

Type Special Mountain Engine
Name or number 207
Name of builder Brooks Locomotive Works

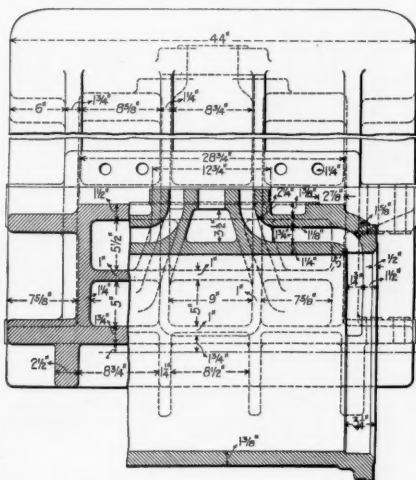


Fig. 6.—Details of Cylinders, 21 in. X 26 in.—Mexican Central Locomotive.

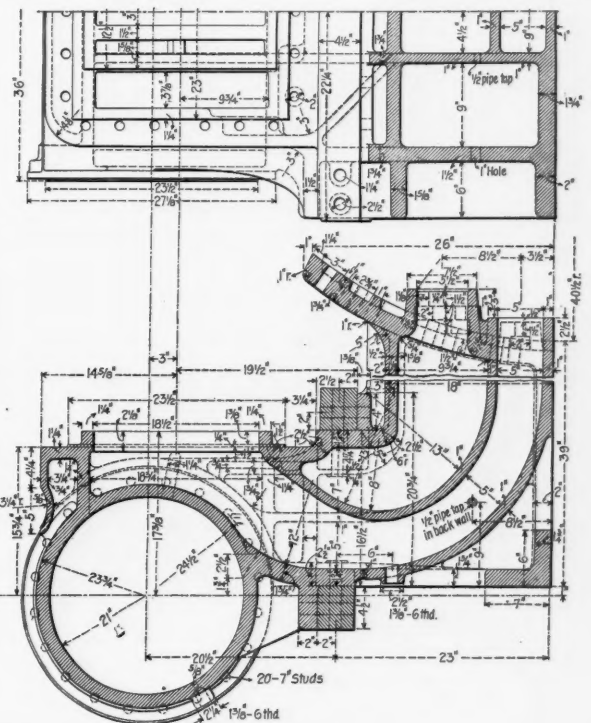


Fig. 5.—Front End of Frame—Mexican Central Locomotive.

with some of the largest locomotives so far built. It will be seen that in the matter of total weight the new engine is almost as heavy as the New York, Lake Erie & Western decapod, which so far as we know is the heaviest

Northern Pacific engine 84. The heavy consolidation locomotives now building by the Pennsylvania Railroad will in total weight about equal the Mexican Central engine, but will have a greater weight on the driving

and only to the new Northern Pacific 12-wheel locomotives in boiler capacity, the Northern Pacific engines having boilers with a larger heating surface than any engines of which we have record. The Mexican Central engine has 89 sq. ft. of heating surface per foot of grate and the

Name of operating road Mexican Central Railway
Gage 4 ft. 8 1/2 in.
Simple or compound Simple
Weight tender loaded 90,000 lbs.
Wheel base, total (engine and tender) 52 ft. 2 1/4 in.
Length over all, total (engine and tender) 61 ft. 4 1/4 in.
Height, center of boiler above rails 9 ft.
of stake above rails 15 ft. 4 1/4 in.

Wheels and Journals.

Drivers, material of centers Cast steel
Front and rear truck wheels, diameter 28 1/4 in.
Journals, driving axle, size 8 1/4 in. x 11 in.
truck 5 in. x 10 in.
Main crank pin, size 6 1/4 in. x 6 1/4 in.

Cylinders.

Piston rod, diameter 4 in.
Kind of piston rod packing R. R. Co.'s style, (soapstone)
Main rod, length center to center 8 ft. 11 in.
Steam ports, length 18 1/4 in.
width 1 1/2 in.
Exhaust ports, length 18 1/2 in.
width 3 in.
Bridge, width 1 1/4 in.

Valves.

Valves, kind of Richardson Balanced
greatest travel 6 in.
outside lap 1 in.
inside lap or clearance 0 in.
lead in full gear 3/8 in.

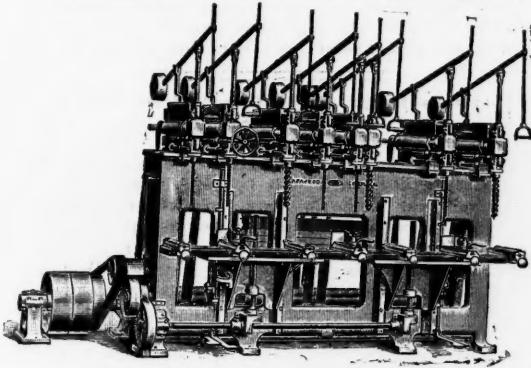
Boiler.

Boiler material in barrel Steel
thickness of material in barrel 3/4 and 1/2 in.
Seams, kind of horizontal Sextuple riveted
circumferential Triple riveted
Thickness of tube sheets Front, 3/4 in.; firebox, 1/2 in.
crown sheet 1/2 in.
Crown sheet stayed with Improved system direct stays
Dome, diameter 30 in.

Firebox.

Material Steel

frame, supporting eight boring spindles and their carriages, and an automatically adjusting table. The boring spindles are separately adjustable, either across the machine or vertically. The transverse adjustments are made by screw and hand-wheel, and the vertical adjustment is made by the movement of a counterbalanced lever. The transverse movement of the spindles is 14 in., and the vertical motion is sufficient to bore through 14 in. of material. Stop collars are fitted to each spindle for



Large Eight-Spindle Vertical Car Boring Machine.

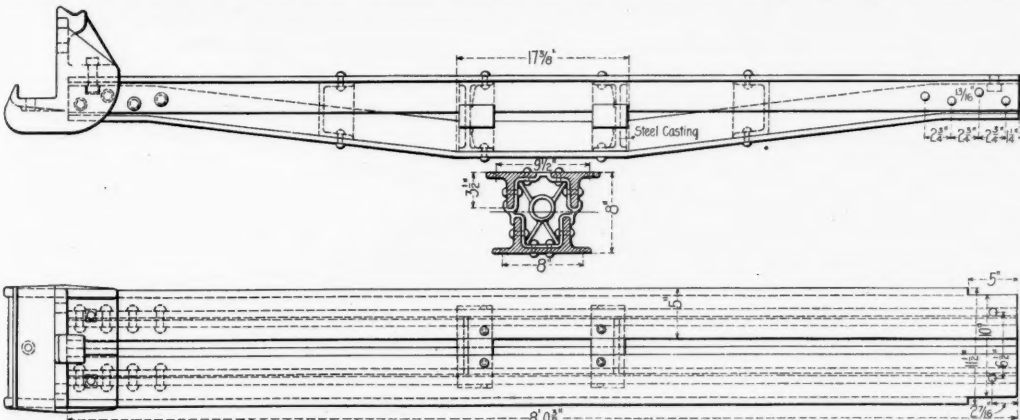
gaging the depth when boring by hand, and for holding them securely to the required position when raising the material to the boring bits by means of the power elevating table. The spindle carriages are moved along the top of the frame independently by a hand-wheel and pinion, which works in a rack that extends the whole length of the machine. The carriages have clamps to hold them firmly in any position.

The table is made heavy to support large timbers, and is raised and lowered on two square thread screws which are operated by friction device, having provision made for taking up the wear. This elevating device is controlled by compound treadles, a pair being at each end of the frame. Stops are provided for regulating the depth of bore, the lower one automatically stopping the movement of the table. Four friction rolls are placed in the table to assist in the ready manipulation of the material, which is held in position by means of eccentric lever clamps. The table will take a timber 14 in. square. With the outside boring spindles at their extreme limit, two holes may be bored 10 ft. from center to center, and eight holes may be bored from $4\frac{1}{2}$ in. to 17 in. apart. Any two spindles may be brought close enough together to bore $4\frac{1}{2}$ in. from center to center. Each spindle is driven by a separate belt from a drum countershaft attached to the base of the frame. The tight and loose pulleys are 18 in. x 8 in., and should make 525 revolutions a minute.

The machine is made by J. A. Fay & Co., of Cincinnati, O., and it can be furnished with more or less spindles than here described.

The Black Diamond Body Bolster.

The engravings show a body bolster patented by Mr. R. W. Oswald, of the Bloomsburg Car Manufacturing Co., and made by that company. Several of these have been shipped to the Lehigh Valley Railroad Co., at Bethlehem, to be put on cars for trial. The line engraving and the engraving from a photograph are self-explanatory. It will be observed that the bolster is very simple. It consists of four T-bars riveted together, as shown in the engravings, and held in position by steel



Black Diamond Body Bolster.

castings. The bolster shown in the line engraving was especially made to fit the Lehigh Valley Railroad castings.

Train Accidents in the United States in September.

COLLISIONS.

REAR.

2d, on Baltimore & Ohio, at Cairo, W. Va., a freight train ran into the rear of a preceding freight which was standing at the station with its rear car on a bridge. The bridge was broken down and the engine and six cars fell into the stream below. The engineer and two tramps were injured, one of the tramps fatally.

3d, on Lake Shore & Michigan Southern, at Lenawee

Junction, Mich., a freight train broke in two and the rear portion afterward ran into the forward one, doing considerable damage. The conductor and one brakeman were injured.

4th, 11 p. m., on Chicago & Eastern Illinois, at Wellington, Ill., a freight train broke in two and the rear portion afterward ran into the forward one, badly damaging 10 cars. The conductor was killed and a tramp was badly injured.

7th, on Fremont, Elkhorn & Missouri Valley, at Buffalo Gap, S. D., a train of empty passenger cars ran into the rear of a preceding freight, wrecking the caboose and two cars. A passenger in the caboose was killed.

15th, 1 a. m., on Baltimore & Ohio, near Seneca, O., the rear portion of a freight train, which had broken away from the front portion, was run into by a following freight train and 14 cars were damaged. The engineer was injured.

15th, on Philadelphia & Erie, at Kane, Pa., a freight train broke in two and the rear portion afterward ran into the forward one. The conductor was injured.

15th, on New York, Chicago & St. Louis, at Wesleyville, Pa., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 7 cars. A tramp was killed.

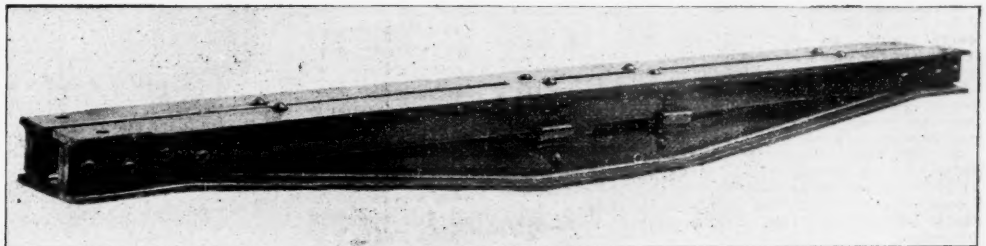
17th, on Lake Shore & Michigan Southern, at Delta, O., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, and 3 cars were derailed. A brakeman was injured.

18th, on Baltimore & Ohio, at Helper Switch, O., a freight train ran into the rear of a preceding freight, badly damaging the engine and 18 cars. One engineer was killed and a tramp was injured. The foremost train had broken apart, and the flagman had not properly protected the rear, and the second train was running too fast.

19th, 3 a. m., on Pittsburgh, Cincinnati, Chicago & St. Louis, near Southport, Ind., a freight train descending a grade broke in two and the rear portion afterward ran into the forward one, wrecking 12 cars. A brakeman was killed.

21th, on Erie road, at Port Jervis, N. Y., a passenger train ran into the rear of a preceding freight, wrecking the engine and several cars of coal. The engineer was injured. The passenger engineer applied the brakes at the usual place on approaching the station, but they did not hold.

25th, on Wisconsin Central, near Chicago, Ill., a passenger train ran through a misplaced switch and into the rear of a freight train; 2 trainmen injured.



Black Diamond Body Bolster.

28th, 3 a. m., on Chicago & Northwestern, at Beverly, Ia., a freight train taking water was run into at the rear by a following freight and 6 loaded cars were derailed. Two trainmen were injured.

28th, on Western New York & Pennsylvania, at Hinsdale, N. Y., a freight train ran into the rear of a preceding freight, damaging 3 cars in the foremost train and 6 in the other. A tramp stealing a ride on the first train was fatally injured. There was a dense fog at the time of the collision, and the flagman of the foremost train did not go back far enough.

29th, 11 a. m., on New York, New Haven & Hartford, at New Haven, Conn., an eastbound passenger train entering the station at uncontrollable speed ran beyond the usual stopping place and collided with an engine standing on the main track, wrecking its tender. The engine of the passenger train was partially overturned and the engineer was killed. An attempt was made to apply the air-brakes at the usual place before reaching the station, but they did not act, on account of the air-pump being shut off and the reservoirs empty. In consequence

Falls, Wis., butting collision of freight trains running at full speed, making a bad wreck. Both engineers, 1 fireman, 1 brakeman and a tramp were killed, and 2 brakemen were injured.

19th, on Wabash road, near St. Louis, Mo., butting collision between a passenger train of the Wabash road and one of the St. Louis, Kansas City & Colorado. The Wabash engine was overturned. One conductor and 4 passengers were injured.

20th, 9 p. m., on Union Pacific, near Muncie, Kan., butting collision between a westbound passenger train and an eastbound Union Pacific cattle train, wrecking both engines, 1 baggage car and several cars of stock. Two engineers and 2 postal clerks were injured. It is said that the passenger train disregarded a meeting order.

21st, on Georgia & Alabama, near Helena, Ga., butting collision of freight trains; one engineer and one fireman killed and one conductor injured.

28th, on Chicago, Burlington & Quincy, at Leon, Ia., butting collision between a passenger train and a stock train, badly damaging both engines and several loaded freight cars. One engineer was injured. It is said that the collision was due to misreading a telegraphic order. And 7 others on 7 roads, involving 6 passenger and 8 freight and other trains.

CROSSING AND MISCELLANEOUS.

3d, on Long Island Road, at Floral Park, N. Y., collision between a passenger train and a freight, badly damaging both engines. Three passengers were slightly injured. The freight ran past a distant and a home signal which were set against it.

3d, on Chicago & Northwestern, at West Side, Ia., a train on a side track was left standing foul of the main track and was struck by a freight train, the freight train drawn by two engines. Both of these engines and several cars were badly damaged and the caboose was wrecked. Two engineers were injured.

4th, on Cincinnati, Hamilton & Dayton, at Chillicothe, O., a passenger train ran over a misplaced switch and into a freight train standing on the side track, damaging several cars. The engineer and fireman jumped off and were injured. The conductor was injured by being thrown against a seat. The baggage man was killed. On feeling the train enter the side track he went to look out and his head was crushed by the closing of the door.

10th, on Philadelphia, Wilmington & Baltimore, at Wawa, Pa., a passenger car being switched from one train to another was allowed to bump violently against another car and 4 passengers were injured, mostly by broken glass.

12th, on Pennsylvania road, at Downingtown, Pa., an empty passenger train, switching on the main track, was run into by a freight train, and one car was badly damaged; one engineer injured.

15th, 7 a. m., on New York Central & Hudson River, at Newark, N. Y., the front portion of a freight train on track No. 3 was backed through a misplaced switch so as to foul track No. 2 immediately in front of a fast westbound passenger train, making a very bad collision. The passenger engine was overturned and fell partially across track No. 1. Coals from the firebox were scattered along the track, and three freight cars and three sleeping cars were burned up. The engineer and fireman were injured, the latter being seriously burned; but although the train was running at high speed no other person was seriously hurt. There was a dense fog at the time, and

the brakeman who set the switch for the crossover thought he was setting one leading to a side track.

15th, on New York Central & Hudson River, at Schenectady, N. Y., collision between a passenger train of the New York Central and a switching engine of the Delaware & Hudson, badly damaging the engines. One fireman was killed.

17th, at Birmingham, Ala., collision of freight trains at the crossing of the Southern and the Alabama Great Southern railroads; 2 employees injured.

19th, 1 a. m., on Erie & Pittsburgh, at Newcastle, Pa., a freight train ran into some freight cars which were being switched on the main track, and the engine and 20 cars were badly damaged. The fireman was killed and the engineman and one brakeman were injured.

19th, on Chicago & Northwestern, at Milwaukee, Wis., a switching engine which fouled the main track was run into by a passenger train, and both engines were badly damaged. The engineman of the switching engine was injured.

19th, 11 p. m., at Hudson, O., a locomotive of the Cleveland & Pittsburgh ran into a passenger train of the Cleveland, Akron & Columbus and overturned the rear car. Two passengers were injured.

23d, 4 a. m., on Staten Island Rapid Transit road, near Clifton, S. I., N. Y., an engine and 5 empty passenger cars being switched in the yards became uncontrollable and ran some distance unattended on the main track; near South Beach the train ran into some standing passenger cars, and several cars were wrecked. The engineman was injured.

30th, on Chicago & Northwestern, at Janesville, Wis., a freight train ran into a switching freight, badly damaging both engines and several cars. The fireman was injured.

And 6 others on 6 roads, involving 4 passenger and 5 freight and other trains.

DERAILMENTS.

DEFECTS OF ROADWAY.

2d, on Delaware, Lackawanna & Western, at Blodgett Mills, N. Y., passenger train No. 4, running at full speed, was derailed and the parlor car was overturned. One other car was derailed. One passenger was killed and 11 passengers and the Superintendent of the road were injured. It is said that the track was undergoing repairs at this point and that a rail broke under the train in consequence of insufficient support.

3d, 9 p. m., on St. Louis & San Francisco, at Valley Park, Mo., a passenger train was derailed and the first 4 cars were ditched. Three tramps were injured. It is said that the derailment was due to a defective switch.

4th, on San Francisco & North Pacific, near Duncan's Mills, Cal., a mixed train broke through a bridge and several freight cars fell to the river below. The engine and passenger cars were not derailed. The fireman was injured.

5th, on Pittsburgh & Western, near Ravenna, O., a freight train was derailed by a broken frog and several cars were wrecked. A brakeman was killed and several tramps were injured, one of them fatally.

23d, on New Orleans & Northwestern, near Oak Ridge, La., a freight train broke through a trestle which had been weakened by fire, and the engine and 2 cars were wrecked, the combustible portion of the wreck being burned up. The engineman was slightly injured.

And 3 others on 3 roads, involving 1 passenger train and 2 freight trains.

DEFECTS OF EQUIPMENT.

5th, on Maine Central, near Etna, Me., an excursion train was derailed by the breaking of a flange and one passenger car was overturned. One passenger was killed and 32 were injured. It is said that most of the injuries occurred in the overturned car, the passengers being thrown to one end in a heap and many being trampled upon.

12th, on St. Louis, Iron Mountain & Southern, at Hanson, I. T., a freight train was derailed by the breaking of a truck, and 15 cars were ditched. In a car of machinery which was wrecked, the dead bodies of 7 tramps were found; and 6 other tramps were injured.

16th, on Central of Georgia, at Davisboro, Ga., a freight train was derailed by a car breaking down, and several cars were ditched. A brakeman was injured.

19th, 5 a. m., on Georgia Railroad, at Norwood, Ga., a freight train was derailed by a breaking of a car, and a brakeman was injured.

27th, on Northern Central, near Georgetown, Pa., the locomotive of a passenger train was wrecked by the explosion of its boiler, and most of the cars in the train were derailed. The engine had just come out of the shops. The engineman was killed and the fireman badly injured. A watchman's cabin was wrecked and the watchman injured.

And 13 others on 13 roads, involving 13 freight trains.

NEGLIGENCE IN OPERATING.

7th, on Baltimore & Ohio, at Cherry Run, W. Va., a car in a freight train was crushed by the pressure of the cars behind it on the sudden application of the air-brakes, and three cars were derailed.

15th, 9 p. m., on Lake Shore & Michigan Southern, at Ashtabula, O., eastbound passenger train No. 6 was derailed at a derailing switch, and the engine and 3 cars fell against some coal cars standing on a side track. The engineman and fireman were slightly injured.

And 9 others on 9 roads, involving 3 passenger and 8 freight and other trains.

UNFORESEEN OBSTRUCTIONS.

5th, 11 p. m., on Wabash road, near Foristell, Mo., passenger train No. 5 was derailed by running over a bull, and the first four cars were ditched. The engine fell down a bank. The engineman and one tramp were killed and the fireman was badly injured.

8th, 2 a. m., on Texas & Pacific, near Plateau, Tex., a freight train was derailed by running over a cow, and the engine and 6 cars were ditched. The engineman and fireman were killed and another trainman was injured.

11th, 1 a. m., on Texas & Pacific, near Wild Horse, Tex., a freight train was derailed by running over some cattle on the track and the engine was overturned. Seven freight cars were wrecked. The engineman was killed and 2 other trainmen were injured, one of them fatally.

27th, 1 a. m., on Oregon Railroad & Navigation Company's Railroad, near John Day's, Or., a freight train was derailed by running into a sand drift and the engine and 2 cars were overturned. The engineman was killed and the fireman injured.

28th, on New England road, near Willimantic, Conn., a passenger train was derailed by striking a horse and wagon which had got stuck in a bridge and the engine, just after leaving the bridge, was overturned; engineman and fireman slightly injured.

And 3 others on 3 roads, involving 1 passenger train and 4 freight trains.

UNEXPLAINED.

4th, on Wisconsin Central, at Palatine, Ill., a freight train was derailed and 6 cars fell down a bank. Two employees were injured.

9th, on Lake Erie & Western, near Albany, Ind., a freight train was derailed on a trestle and 8 loaded cars were wrecked. Two tramps riding on one of the cars were killed.

23d, on Baltimore & Ohio, near Layton, Pa., a freight train was derailed and several cars were wrecked. A man riding in one of the cars was killed.

27th, on Lehigh Valley, at Glendon, Pa., a car in a freight train was derailed on a trestle and the conductor fell to the street below and was badly injured.

And 19 others on 15 roads, involving 4 passenger and 16 freight and other trains.

A summary will be found on another page.

New Compressed Air Mining Locomotive.

Among locomotive builders to enter the field of pneumatics is the Dickson Manufacturing Co., which has lately completed an air motor for the D. & H. Canal Co. This motor, shown herewith, is now in service at the Wilson Creek colliery of that company, where it has been giving very satisfactory results. It is not claimed by the company that air as a power for locomotives is cheaper than steam, but a motor can often be used where a steam locomotive cannot, as is also the case of steam storage motors, discussed last week. There is no steam boiler with its firebox to maintain and no ashes to handle. Again the absence of ashes from the machinery materially reduces the cost of its maintenance. It may be said that if there is no boiler on the motor there must be at the compressor; while this is a fact the whole expense of the boiler attendance and building is not a direct charge on the motor, where the plant is used for other purposes. At the mine where this motor is in service no increase whatever in boiler attendance has been required.

The motor from the frame down is practically the same as a steam locomotive, and of the 6-wheel connected type. It has cylinders 9 in. x 14 in., driving wheels 26 in. diameter, and a wheelbase of 7 ft., with a gage of 30 in. The two main storage tanks or reservoirs placed on the frame are steel tanks 30 in. diameter, one of which is 18½ and the other 15½ ft. in length. The tanks are designed to carry a pressure of 600 lbs., but these can carry with safety a pressure of 800 lbs. The tanks rest on saddles front and back, which are secured to the frames and bind them and the tanks firmly together.

In motors of this description it has usually been the habit to place the operator at the opposite end of the motor from the cylinder, but in this one the operator is placed at the cylinder end of the motor. This position does away with the use of long connecting pipes and levers, with the liability to disarrangement, and all connections between the storage tank and cylinders are direct and short. Another advantage of this arrangement is that the operator is close to the cylinders and the main working parts of the motor, and can keep these under closer observation than from the opposite end.

In the operation of the motor the air is supplied from a three-stage Norwalk compressor and delivered to a pipe line extending to the charging stations for the compressor, one of which is at the mouth of the mine and the other at a point 4,100 ft. from the outside station. The pipe line answers the double purpose of carrying the air to the motor and of providing a storage reservoir. Its capacity is seven times the storage capacity of the tanks on the motor, and carries a pressure of 700 lbs. It will thus be seen that the motor with a tank pressure of 600 lbs. and 160 cu. ft. capacity can be quickly charged to full pressure without the aid of the compressor, the actual time required being but 1 minute 25 seconds.

From the supply pipe to the motor storage, connections are made with pipe fitted with Moran joints that allow considerable range in the location of the motor when charging. The filling pipe is supplied with a check valve that holds the air in the tank and avoids the use of cocks. In charging, the air flows into both tanks through an equalizing pipe that is supplied with two shut-off valves which enables each tank to be independent of the other.

In working, the air is passed through a regulating valve to an auxiliary tank placed below the two main tanks, on which the pressure is kept at 125 lbs. at which pressure the air is admitted to the cylinders by means of the throttle, beyond which point the power is controlled as in the steam locomotive. Refrigeration has always been a source of trouble in air motors where the terminal pressure has been high. In this motor the power was designed to haul 30 cars and allow a low terminal pressure at time of release. Special arrangement of the exhaust passages was made to prevent refrigeration, and that it has been efficient is proven by the fact that the motor has without trouble pulled a train of 50 cars, thus creating a terminal pressure very much higher than was designed to be overcome.

This motor is now pulling trains of 30 cars, whose total weight in load and cars is 5,856 lbs. each, from the end of the slope to the delivery point, a train distance of 4,100 feet, and in addition makes a switching distance of 800 ft. for each trip. The time consumed for each round trip is, on an average, 16 minutes.

It is too early yet to fix the exact cost per ton per mile, but from the data obtained, allowing all charges, it is now costing at Wilson Creek less than 1¼ cents per ton per mile for haulage, and as the operator in charge of the motor becomes experienced and economical in the use of the air, that expense can undoubtedly be reduced.

Ten-Wheel Freight Engine Chicago & North Western Railway.

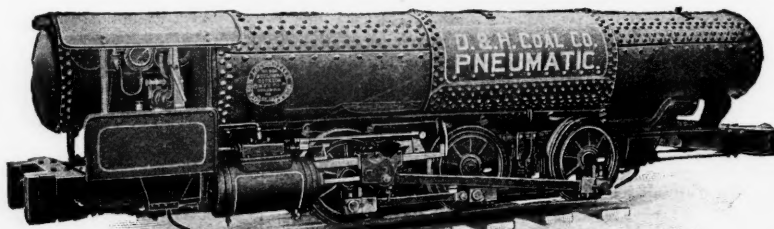
The engraving from a photograph shows a 10-wheel freight engine recently built by the Schenectady Locomotive Works for the Chicago & Northwestern Railway. The dimensions and other particulars are given in the table. Cast steel enters largely into this engine, the following parts being made of that material: Driving wheel centers, foot plate, frame fillings, expansion knees, guide yoke knees, driving-box saddles, expansion pads and links and rock-shafts. The following are made of pressed steel: Boiler front and boiler dome connection to the boiler, dome ring, dome cap, cylinder head casings and dome casing.

These engines are designed for freight service on the Galena and Iowa divisions between Chicago and Council Bluffs, mostly on the heavy grades in Iowa. They are somewhat different in design from the 10-wheel engines now in use on this road. No malleable iron has been used in their construction.

TEN-WHEEL FREIGHT ENGINE—CHICAGO & NORTHWESTERN.

Description.

Name of builder.....Schenectady Locomotive Works
Gage.....4 ft. 8½ in.



Compressed Air Mining Motor—Dickson Manufacturing Company, Scranton, Pa.

Simple or compound.....	Simple
Kind of fuel.....	Bituminous coal
Weight on drivers.....	118,000 lbs.
" truck wheels.....	38,000 lbs.
" total.....	156,000 lbs.
tender loaded.....	93,500 lbs.

General Dimensions.

Wheel base, total of engine.....	25 ft. 10 in.
" driving.....	14 ft. 10 in.
" total (engine and tender).....	51 ft. 8½ in.
Length over all, engine.....	38 ft. 4½ in.
" total, engine and tender.....	60 ft. 4½ in.
Height, center of boiler above rails.....	8 ft. 5 in.
of stack.....	14 ft. 9 in.
Heating surface, firebox.....	152.6 sq. ft.
" tubes.....	2,158.3 sq. ft.
" total.....	2,310.9 sq. ft.
Grate area.....	28.65 sq. ft.

Wheels and Journals.

Drivers, number.....	6
" diameter.....	63 in.
" material of centers.....	Cast steel
Truck wheels, diameter.....	30 in.
Journals, driving axle, size.....	8½ in. dia. x 11½ in.
" truck.....	6 in. dia. x 10 in.
Main crank pin, size.....	5½ in. dia. x 6 in.

Cylinders.

Cylinders, diameter.....	19 in.
Piston stroke.....	28 in.
rod, diameter.....	3¼ in.
Kind of piston rod packing.....	Cryseal metallic
Main rod, length center to center.....	10 ft. 6½ in.
Steam ports, length.....	16 in.
" width.....	1½ in.
Exhaust ports, length.....	18 in.
" width.....	3 in.
Bridge, width.....	1½ in.

Valves.

Valves, kind of.....	Allen-American
" greatest travel.....	5½ in.
" outside lap.....	¾ in.
" inside lap or clearance.....	Line and line
Lead in full gear.....	¾ in. blind full gear forward
" ¾ in. blind full gear back motion	
with about ½ lead at 6-in. cut off forward motion	
" lead, constant or variable.....	Variable

Boiler.

Boiler, type of.....	Extended wagon top
" working steam pressure.....	190 lbs.
" material in barrel.....	Carbon steel
" thickness of material in barrel.....	¾ in. in end and 1 in.
" diameter of barrel, inside.....	63 in.
Seams, kind of horizontal.....	Butt joint, sextuple riveted
" with welt strip inside and outside	
Seams, kind of circumferential.....	Double riveted
Thickness of tube sheets.....	1½ in.
" crown sheet.....	¾ in.
Crown sheet stayed with.....	Radial stays 1 in. diameter
Dome, diameter.....	30 in.

Firebox.

Firebox, length.....	8 ft. 6½ in.
" width.....	3 ft. 4½ in.
" depth front.....	79½ in.
" back.....	67½ in.
" material.....	Carbon steel
" thickness of sheets.....	1½ ¾ in.
" brick arch.....	Yes
" water space width; front, 4½ in. to 5 in. under tub; sides 4 in.; back, 4 in.	

Grate, kind of.....Rocking R. K. Co.'s style

Tubes.

Tubes, number.....	295
" material.....	Charcoal iron

Tubes, outside diameter.....	2 in.
length over sheets.....	14 ft. 2 in.
<i>Smokebox.</i>	
Smokebox, diameter.....	67 1/2 in.
length.....	71 1/2 in.
<i>Other Parts.</i>	
Exhaust nozzle, single or double.....	Single
variable or permanent.....	Permanent
diameter.....	4 1/4 in., 5 in. and 5 1/4 in.
distance of tip above or below center of boiler.....	5 1/4 in.
Netting, wire plate.....	Perforated plate
size of mesh or perforation.....	1 1/2 in. x 1 1/2 in.
Stack, straight or tapered.....	Taper cast iron
least diameter.....	14 in.
greatest diameter.....	16 1/2 in.
height above smokebox.....	3 ft. 6 1/2 in.
<i>Tender.</i>	
Type—6-wheel or with swivel trucks.....	Swivel
Tank capacity for water.....	4,500 gals.
Coal capacity.....	8 (2,000 lb.) tons
Kind of material in tank.....	Central steel
Thickness of tank sheets.....	3/4 in. and 1/2 in.
Type of under-frame, wood or iron.....	10-in. steel channels
Type of truck.....	4-wheel
Truck with swinging motion or rigid bolster.....	Rigid
Type of truck spring.....	Double elliptic
Diameter of truck wheels.....	33 in.
Diameter and length of axle journals.....	4 1/2 in. x 8 in.
Distance between centers of journals.....	75 in.
Diameter of wheel fit on axle.....	6 1/2 in.
Diameter of center of axle.....	4 1/2 in.
Type of truck bolster.....	Channel iron
Type of truck ransom.....	Channel iron
Length of tender frame over bumpers.....	20 ft. 3 1/2 in.
Length of tank.....	19 ft.
Width of tank.....	9 ft. 2 in.
Height of tank, not including collar.....	4 ft. 8 in.
Height of tank over collar.....	5 ft. 8 in.
Type of back drawhead.....	Chicago coupler
With or without water scoop.....	Without
<i>Makers of Special Equipment.</i>	
Wheel centers.....	American Steel Casting Co.
Tires.....	Dean's
Axles.....	N. & Co. Monitor No. 8 Type "R" of 1897
Sight-feed lubricators.....	S. L. W.
Bell ringer.....	Nathan latest improved
	Gollmar

a uniform rate of 5 cents from Pemberton to Nantasket and 5 cents from Nantasket to East Weymouth, a total of 10 cents from Pemberton to East Weymouth. Under these new conditions, the traffic has increased enormously on this line; the summer of 1895, the first of electrical operation, showing an increase of 92.8 per cent. over the previous summer in the number of passengers carried; the summer of 1896 showing 45.1 per cent. increase over 1895, while, in the summer just passed, we have carried nearly three times as many passengers as in the last year of steam operation.

The operation of the line from New Britain to Hartford was commenced in May last, with a regular half-hour train schedule from 6:00 in the morning to 11:30 at night, and with a uniform fare of 10 cents each way, instead of 23 cents, the former charge. The electric line carries through passengers only between Hartford and New Britain, the passengers for the five way stations being carried by the regular steam trains running on a parallel track. For ordinary everyday service, a single open motor car was used during the past summer, while for extra loads light double-truck rail cars, seating 70 people, were attached. On rainy days a standard close passenger coach was hauled by the open motor car. On holidays and Sundays the cars pulled two trailers, the entire train seating nearly 250 passengers. About the middle of August steam service on the Berlin-New Britain Branch was discontinued, and traffic has since been handled entirely by electricity. Sixteen trains each way per day are run, connecting with steam trains.

Under the conditions named on the Hartford-New Britain line we have carried, during the three summer months, 400 per cent. more passengers than we carried through the corresponding months of last year.

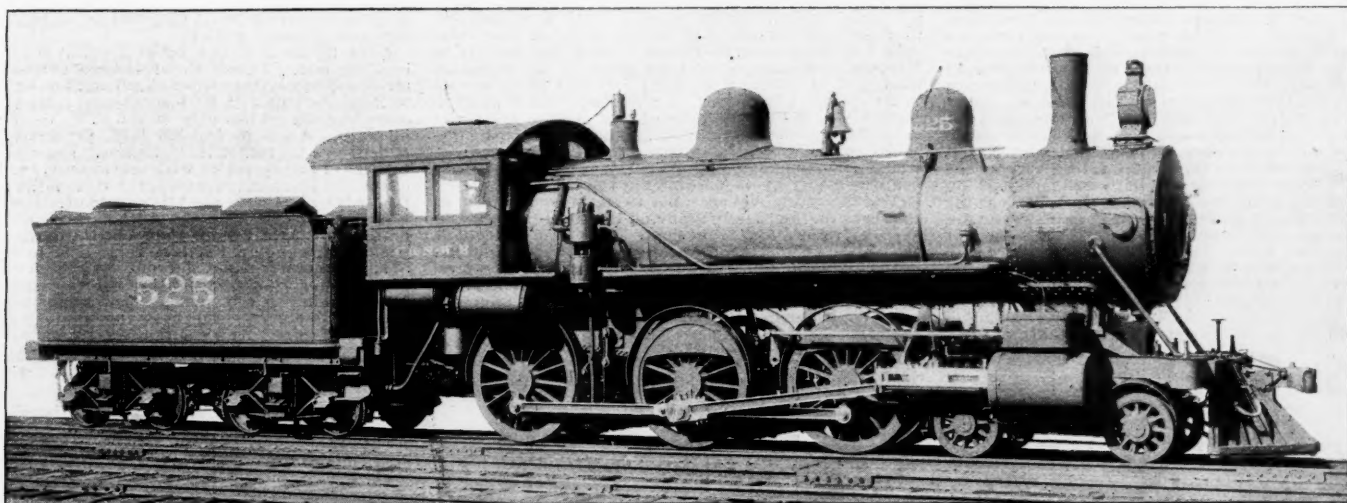
Speed, Acceleration and Schedules.—I do not suppose that any but a trained railroad man can understand the impossibility of operating trains and maintaining schedules by steam locomotives in the way that has been done by electricity at Nantasket Beach this summer. There are a great many curves on the line and several grades. There are no excessively sharp curvatures or steep grades, and it is not here that the trouble has come. The difficulty is found in the fact that there are no less than 17 stations on a line only 10.6 miles in length, or an average distance between stations of but about

passengers of the smoke and gases from engines. This has naturally thrown a great deal of traffic to competing street railroad lines running open cars in summer on account of the much greater pleasure in riding.

With electric operation, open cars in heavy railroad practice are possible, even at considerable speed, particularly if the front of the car is closed in with glass, and both at Nantasket Beach and on the Hartford-New Britain line we have used heavy open cars with great success.

The motor car which we have so far used we do not consider by any means the final type, and even now we have in mind plans of combination cars which we believe will be, on the whole, well adapted for railroad work. Each car has two heavy railroad trucks, one of which is equipped with two 125 H. P. motors. The total weight of the motor car is 32 tons, and the trailer car of the same type weighs 25 tons. The motors which we have used up to date have been of a type common in heavy elevated railway work. These motors have often been in service for several consecutive days, making 334 miles each day, without apparent injury. We found the motors we are using already in the market when we commenced our experiments, and until recently no attempt has been made by us to specify changes. Under these circumstances, great credit is due the manufacturers for their efforts to meet the difficulties encountered. The experience gained with these motors has served as a basis for building larger and heavier types, better adapted for the severe work which they will be called upon to fulfill to meet our requirements. An important point which we shall specify in new motors is that they shall have the most perfect ventilation possible. The efforts of manufacturers have been hitherto directed toward completely encasing the motors, so as to make them waterproof, but in doing this ventilation has been sacrificed. We have found it beneficial to blow out our motors several times during the day by means of a blast of air from a hose pipe connected to our air brake reservoir, but this is, at best, but a makeshift.

It is very difficult to dispose of all the necessary cables, wires, brake rods and chains, air brake cylinders and apparatus, switches and other car controlling mechanism in the limited space beneath the car floor, as may be readily imagined by those familiar with street



Ten-Wheel Freight Engine—Chicago & Northwestern Railway.

Front and back couplers.....	Chicago
safety valve.....	Ashton
Sanding devices.....	Dean's
Injector.....	N. & Co. Monitor No. 8 Type "R" of 1897
Driver brake equipment.....	American
Tender brake equipment.....	Westinghouse
Tender brake beam.....	Kewanee
Tender brake shoe.....	Ross-Meehan
Air pump.....	Westinghouse, 9 1/4 in.
Air pump governor.....	Westinghouse
Steam gages.....	Ashcroft
Engine truck springs.....	S. L. W.
Driving springs.....	"
Tender springs.....	"
Piston rod packings.....	Crysler
Valve.....	"

Application of Electricity to Railroads Now Operated by Steam Power.*

BY H. N. HEFT.

Train Service and Traffic.—We have learned very thoroughly the lesson of the importance to any transportation agency, working in a thickly populated territory, of uniform fares and a frequent and regular train service—of a train service which requires no printed schedule to enable people to know when cars may be found in waiting. The time has come when every progressive railroad manager must recognize that new conditions and the new character of competition requires a complete change of operating methods.

On its Nantasket Beach line, the New Haven Company gave, during the last summer, a regular half-hour service from 6:30 in the morning until 11:30 at night. When unusually heavy boat loads arrived at Pemberton from Boston, trains were run in as many sections as were found necessary to take care of the people, but still the half-hour schedule was not departed from on ordinary days. On Sundays and holidays, when boats arrived at Pemberton every 15 minutes during the greater part of the day, express trains between Pemberton and Nantasket were sandwiched in between accommodation trains in such a way as to give a 15-minute schedule of alternate express and accommodation trains. The time-table this summer required 33 regular trains daily, each way, between East Weymouth and Pemberton. During July and August the traffic increased to such an extent as to require six motor cars in constant week-day service, and on Sundays and holidays 11 motor cars have frequently been called for.

The fares charged on the Nantasket Beach line before the advent of electricity were 10 cents from Pemberton to Nantasket and 18 cents from Nantasket to East Weymouth, a total of 28 cents from Pemberton to East Weymouth. With electric traction they have been placed at

0.6 of a mile. To make a run of 10 miles with 16 stops in 26 minutes; to be obliged to do this in order to connect with boats arriving at regular half-hour intervals, and to keep out of the way of frequent regular steam trains on the main line of the Plymouth Division; to allow but four minutes at each end for unloading, switching (including running around trail car) and loading; and to do this day in and day out, in the regular service, through an entire summer; these are things which cannot possibly be accomplished by steam locomotives.

Now, the reason why electricity can do this and steam cannot is found in the tremendous accelerating power of properly designed electric motors, with rotary motion as compared with reciprocal motion of steam locomotives. By examination of the curve of acceleration plotted from actual tests of a 60-ton train (see Fig. 3), and of the practical results shown in the curve of speed between stations in a service run on the Nantasket Beach line (see Fig. 2), as well as the accompanying time chart made up from the company's printed time cards, it will be seen how enormous is this accelerative power. Fig. 4 shows a section of the third-rail conductor.

It will be seen, for example, that a 60-ton train, in running from Windermere to Allerton, a distance of only 1,800 ft., reaches a maximum speed of 31 miles per hour, while in the longer run from Power Station to Nantasket Junction, a distance of but 5,808 ft., a maximum speed of 39 miles is reached. The entire distance is covered, in regular service, at an average speed of 24.6 miles per hour, including stops.

Between Hartford and New Britain, the 9.3 miles distance is covered regularly by motor cars with two trailers in from 18 to 20 minutes, an average speed of from 28 to 30 miles per hour, while with a special high-gear motor a maximum speed of over 60 miles has been made; the entire distance of 9.3 miles being covered in 10 minutes. On this line a 52-ton train often reaches a maximum speed of 50 miles per hour. The current is cut off at 29 grade crossings when single car trains are run.

It is worthy of note in this connection that the line between New Britain and Hartford is in direct competition with a trolley line between the same points, but following a more circuitous route. The schedule time of trolley cars is 55 minutes, as against our time of less than 20 minutes, and the rate of fare is 15 cents (including a transfer given for use on the street railways of either city), as against ours of 10 cents for the straight run between the two cities only. The ownership of right of way has a very important influence upon speed and competitive conditions under circumstances like these.

Cars and Equipment.—The type of car selected for any good transportation service has a direct bearing upon the development of traffic and maximum gross receipts. It has been difficult for steam railroads to depart far from the long-established custom of closed passenger coaches of the present standard type, and to adopt open cars, on account of the disagreeable effect on

roadwork. As a consequence, there has always been more or less controversy between those responsible for the placing of the different portions of the equipment, as to who shall have the first right to a given space, perhaps hardly half a dozen square inches in section. There is also more or less trouble with abraded wires, short-circuited shoe hangers, etc., and for our future work we are making an effort to simplify this mass of equipment mechanism by putting some of it, particularly the wires and cables, in a space between the true floor of the car and a false floor several inches below, specially provided for the purpose.

For operating heavy trains of this character, where currents of from 500 to 1,000 amperes are sometimes used, the controlling apparatus must be massive and strong in every part, and the greatest care must be taken to prevent arcing. We have had no trouble with controlling apparatus on our regular equipments, and we consider this branch of the apparatus well perfected.

The problem of braking, which is so important in street railroading, is found more so with us, since the train weights and speed are enormously greater. The regular Westinghouse air-brake system, with engineer's valve, is used on our electric trains, but we have an electric motor compressor, controlled by an automatic regulator which has given excellent satisfaction.

Our experience with trolleys on the overhead line at Nantasket Beach, originally put in two years ago, has not been satisfactory. We find it quite impossible to prevent the destruction of trolley wheels by almost continual arcing when attempting to take from the wire the heavy current required in starting and during acceleration, as well as the smaller currents taken at the maximum speed. There has been a good deal of trouble, moreover, in keeping the trolley on the wire in making speed and taking curves, and many trolley poles have been broken. The trolley difficulties have not interfered with the continuous operation of our line, but the cost of replacing wheels and poles has been rather large.

These difficulties have had an important influence in causing us to reach a decision in favor of the third rail. The contact shoes which take the current from the rail to the motor circuit have given, on the whole, good satisfaction, although they are occasionally carried away by the approach blocks at grade crossing when these blocks happen to be slightly misplaced so that the shoes strike them at the wrong angle. The contact shoes are suspended by cast-iron links, which are intended to be weak enough to allow the shoe to break away easily without doing damage to the framework of the car. The trail cars are also equipped with shoes and connected with the circuits on the motor car by means of flexible couplings, and it is possible, therefore, when the cars are run in train, to bridge the longest gaps found at grade crossings and switches, so that it is not necessary to turn the current off on approaching these. This arrangement makes our trail cars independent of the motor car for heating and lighting.

It will be noted, perhaps, that the Nantasket motor

* From a paper before the Niagara meeting of the American Street Railway Association.

cars have two trolley poles, as well as contact shoes, and the changing from trolley to third rail simply means the pulling down of the pole and the closing of the third rail switch.

Third Rail and Return Circuit.—Our third rail and return circuit experience will perhaps be of value to both street and steam railroad managers, as we have undoubtedly made a wide departure from established

the danger as being at all serious or one which should interfere with the extension of the system.

As a result of exceptional care which we have taken in bonding our third and service rails, we have found it unnecessary, in any third rail work so far done, to use copper feeders, in spite of the fact that we are obliged to transmit current from Berlin to Hartford, a distance, as before stated, of 12.3 miles, straight away from the

any engineering fads, but to provide apparatus proved by long experience to be of the most simple and durable character.

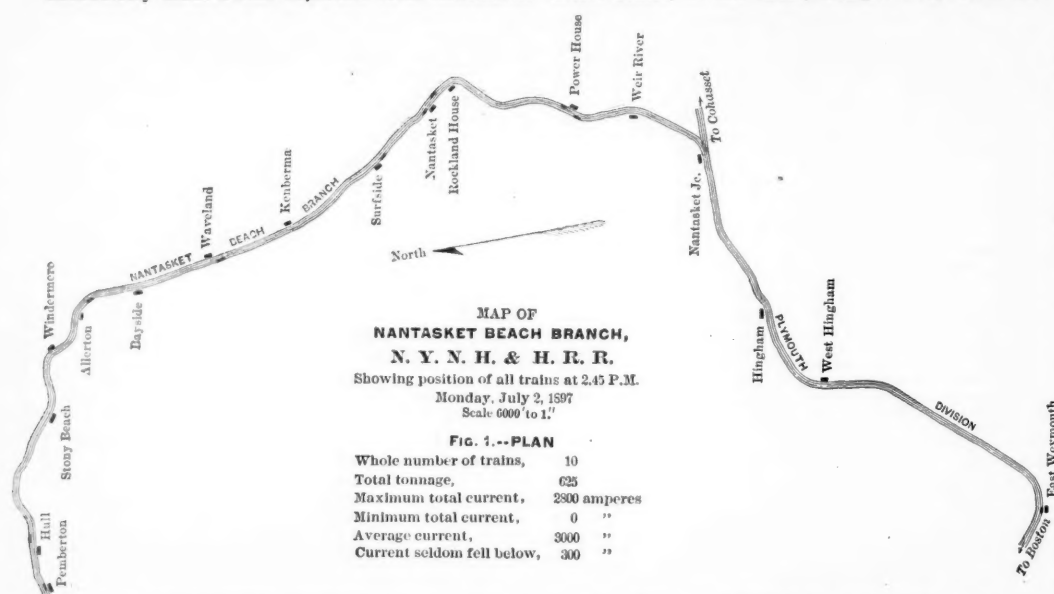
The details of piping and arrangement of steam apparatus have been so thoroughly described in the technical papers that it is unnecessary to refer to them here.*

We are now running our Nantasket plant condensing and our Berlin plant non-condensing, the loads in the latter being too light to make condensing profitable.

In spite of the fact that these general conditions of operation do not point to a low cost of power, because of the fact that we are working neither station at anywhere near its full capacity, I suppose we are, as a matter of fact, producing power more cheaply than can be done in any power station in the country using coal as a fuel, the reason being that we are burning sparks. "Sparks," as we are accustomed to call them, are the half-consumed coal dumped from the extension front of locomotives at the company's various roundhouses. Nevertheless there is a great deal of steam generating value in these sparks, as we have found by experience, and they are being carried on the company's cars to our stations at Berlin, Nantasket and Stamford, and charged to the electrical operation at the cost of freight (including the usual profit to the company for transportation), plus the cost of loading and unloading, a total charge of 70 cents per ton delivered.

In order to burn these sparks we are obliged, of course, to make some changes in the furnace arrangements, chief among which is provision for the introduction of live steam under the grates, forming a blower or forced draft as well as providing the water which, in decomposition, furnishes the oxygen and hydrogen gases which increase greatly and facilitate in combustion of half-burned coal and add enormously to the furnace heat. We originally supposed that some form of shaking or self-cleaning grate would be necessary in burning sparks, but have found in practice that, with ordinary grates, together with the steam blower, there is no difficulty. In our experimental days it was thought that it might be necessary to use a proportion of ordinary soft coal with the sparks, and did so for a while, but it was not long before our firemen were educated to burn sparks only with entire ease, and no other kind of fuel is now used by us. Of course, we have to use a greater weight of this half-consumed coal than would be the case with new coal, but still the economy is great, as a good quality of run-of-mine coal costs us, in Connecticut, about \$3 per ton delivered at power station.

A few figures as to the cost of power at Stamford may be of interest. This station furnishes current for our street railway system at Stamford and for lighting our railroad stations with 350 incandescent lamps. We are operating one engine only of 300 H. P. total capacity, direct connected to one 300 KW. generator. In the boiler room are six 200 H. P. boilers. For the first six months of full operation with sparks only, the total cost of fuel for this station amounted to 3 mills per horsepower hour or 4 mills per kilowatt hour. For so small a station and one where the average amount of power developed is hardly more than one-third the rated capacity of the engine, I believe this to be a low figure. We have recently made, for our own information, for use in larger plants, special tests of the cost of power developed in this way, using for this purpose a water rheostat, in order to lead the engine up to more nearly its full capacity. As a result of these tests we find the



methods. We have solved a number of interesting problems. First is the question of insulation. The third rail has a potential of 600 volts above the ground and rests upon creosoted wooden blocks doweled into the ties, its eaves being only 1 3/4 in. above the tie. Now it frequently happens that water accumulates 2 in. or more in depth over the ties, and, if it were not for our experience to the contrary, we would naturally suppose that, under these circumstances, the line would be directly short circuited between the third and service rails through the water, the distance being but about 2 ft. each way. Nevertheless, we have been able to operate our road without the slightest difficulty when this has happened, and nothing unusual has been noticed at the station, nor has the electrical output as registered by the recording wattmeter been abnormal. At Berlin we have watched the meter closely when we knew the tracks to be submerged in two places 10 miles apart, during a heavy rainstorm, and have found that the leakage was almost imperceptible when both cars on the line were at rest and their air pumps out of circuit. At the same time the wattmeter was standing still. Of course, if a long length of track

power station. This work is made up as follows: From Berlin to New Britain, a distance of three miles, there is a complete double track electric road, with two 100-lb. third rails and four 74-lb. service rails, all most carefully bonded, as described above. From New Britain to Hartford, a distance of 9.3 miles, there is one complete electric track, with 100 lb. third rail and 70-lb. service rails, all carefully bonded, in addition to which we have connected to the service rails of the electric track the rails of the second track, paralleling this the entire distance, at various places, in order to get the benefit of whatever conducting power there might be in this track, connected only by its fish plates at the joints. As a result of this work, we are able to run two trains of 52 tons each on the New Britain and Hartford line with an average loss of but 26 1/2 per cent. The current output of the station at such a time averages about 300 amperes, with a maximum flow of about 700 amperes at a pressure of 600 volts. Of course, if the service were heavier, so that more cars would be required, it would undoubtedly be necessary to reinforce the third rail with feeders.

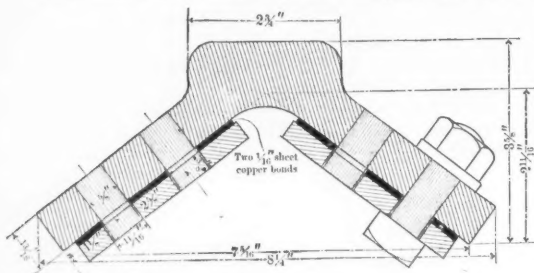


Fig. 4.—Section of Third Rail.

was submerged, the leakage might become serious, but we have yet to learn how much is necessary to accomplish this result.

We aim to so connect our third rail lines and the service rail return as to have a practically complete metallic circuit of extremely low resistance, as far as possible disconnected with the ground. We do not believe in grounding our track, and, though ground plates are placed at the station, connected to our generator, by far the largest proportion of the return current comes through the cables connected directly with the track, the percentage coming from the ground plates being extremely small. The joints of the third rail are bonded by long copper plates firmly bolted to both sides of the joint, 16 bolts being used in all. These copper plates are tinned before being put into position. Owing to the large area of contact surface the presence of rust on this surface does not materially interfere with the conductivity of the joint, as shown by accurate tests.

The service rails are bonded with the greatest care, four copper leaf-bonds, having a cross-section of copper equal in conductivity to that of the rail, being used. These bonds are inserted in the base of the rail, instead of the web, so as to prevent breakage through play at the joints. The copper leaves are cast into end-piece blocks in such a way as to weld them thoroughly together in the blocks. The latter are formed into a hollow cylinder 1 in. in diameter, which passes through a hole in the flange, and by which a large area of contact is secured. Tapered pins are driven into the inside of this cylinder from the top of the flange and the connection made is very perfect. The form of this service rail bond is shown in Fig. 5. Careful tests have shown that the joints of both third and service rails have now a slightly greater conductivity than an equal length of the rails themselves.

A few words about the danger of the third rail system would be, perhaps, in order. There have been many cases of people who have stepped from the ground to the third rail without feeling the current, and anyone can step upon it from a dry tie without the slightest effect. On all except wet days our employees work about it without trouble, avoiding, of course, putting themselves in direct contact with both service and third rails, but not infrequently "monkeying" with the current in such a way as to get shocks of more or less severity in a sort of horse play. On wet days they refer to the third rail as being "lively," and are inclined to let it alone. Many of our employees have, however, received the heaviest shock possible to obtain, time after time, and care little about it, though those who are more influenced by electric shocks than others are sometimes thrown off their feet, but recover fully in a few minutes. We do not say that the third rail has no dangers, but we not consider

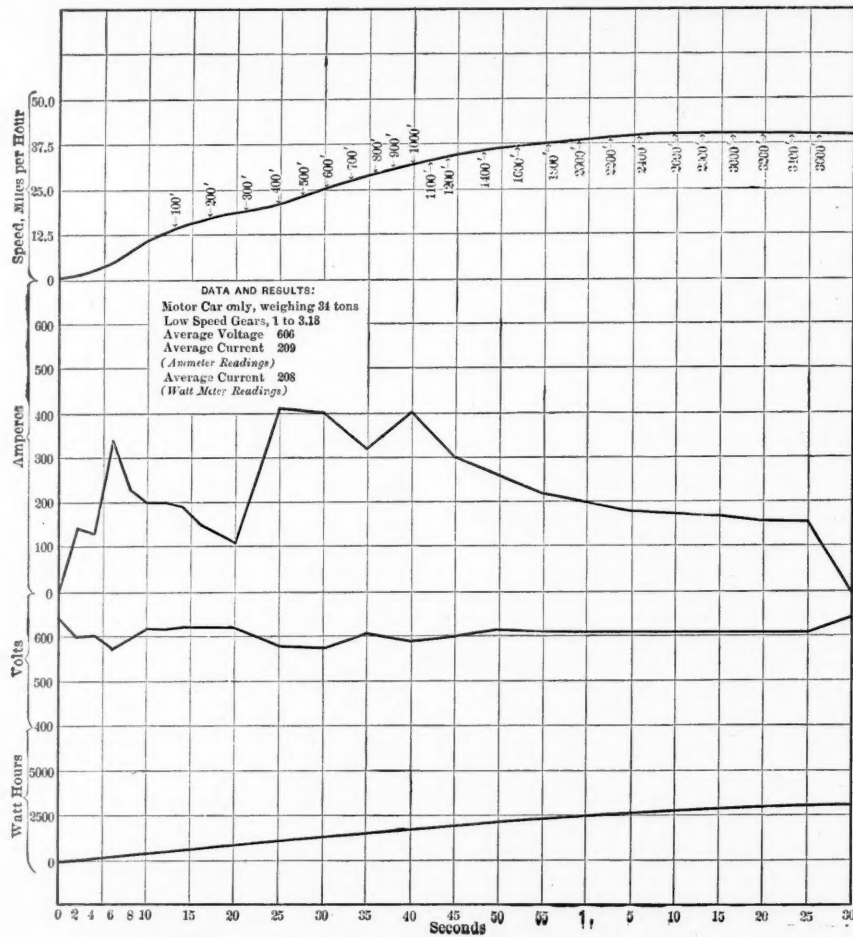


Fig. 2.—Results of Test with a 34 Ton Motor Car—Nantasket Beach Line.

Cost of Power.—In our Nantasket Beach station we have installed two engine generator units of 800 H. P. and 550 KW. capacity each. The steam is supplied by eight boilers of 200 H. P. rated capacity each. On heavy days both these engines are required, but on ordinary days but one only, and this is not fully loaded; the average loads being perhaps one-half the maximum.

In the Berlin station we have installed two engine generators of 1,200 H. P. and 850 KW. each. The steam is supplied by 10 horizontal tubular boilers, of 200 H. P. each. One unit only is required in the practical operation of all the cars on the Berlin and Hartford lines, and the average power output is hardly one-fourth of the maximum capacity.

In both stations our aim has been not to follow out

cost of fuel for power, with the use of coal, to be 3.2 mills per horse-power hour, or 4.2 mills per kilowatt hour. With the use of sparks the cost is reduced to 1.9 mills per horse-power hour, or 2.5 mills per kilowatt hour.

At our Nantasket power station this season the cost of fuel, with the use of coal, has averaged 4.2 mills per horse-power hour or 5.6 mills per kilowatt hour, while with the use of sparks the cost has been 2.1 mills per horse-power hour or 2.8 per kilowatt hour.

* For description of Nantasket Beach line see *Railroad Gazette*, July 3, 1896, and previous articles; for Hartford-New Britain line see issue of May 21, 1897.

As before stated, our Berlin plant has not been run as economically thus far as it will be when a greater load is put on the engines and it will seem to be in the interest of economy to run compound condensing. At this station, the cost of fuel, with the use of coal, has been 9 mills per horse-power hour or 12 mills per kilowatt hour. Using sparks as fuel has reduced this cost to 3 mills per horse-power hour or 4 mills per kilowatt hour.

It is very difficult, of course, if not impossible, to make any direct comparisons between the cost of motive power for electric railroading and that for steam railroading on account of the different way in which the trains are made up. The best criterion would be the cost of motive power per ton-mile hauled, but even here the results would be of little value on account of the wide difference in conditions and, as a matter of fact, we have never attempted to make such comparisons.

DISCUSSION.

Mr. GEO. W. PALMER, JR., Falls River, Mass. Can you give us any figures which will show us the total cost of power per car mile?

Mr. HEFT: That would depend entirely on the conditions at your station. No two stations would have the same conditions. At Stamford our power costs us a great deal less, because we are running nearer to the normal capacity of our engines. At Nantasket the economy is not so great, and at Berlin, where we are only running the high-pressure side of the engine, it costs a great deal more. This is true also of the labor. The labor where the large engines are costs more than it does with the small engines, where you are running far below your normal load. If we were running our Berlin station up to its normal capacity we would show a greater economy in fuel and labor than in the other power stations, because there is a certain fixed charge which we are subjected to at all stations, and the amount of that depends on the size of the station and the number of units.

Mr. J. K. NEWMAN, New Orleans, La.: What is the cost of the sparks?

Mr. HEFT: I stated that to be 70 cents for a ton of 2,000 lbs. While the sparks do not cost our company anything (it is really an expense to get rid of them, as every steam railroad man knows), we pay our motive power department of the road the cost of handling and loading, and the freight department the freight between the points where it is loaded and our power station.

Mr. CHAS. K. DURBIN, Denver, Col.: Can you give me some idea of the relative cost of construction of the third rail system, as compared with the overhead and feeder system?

Mr. HEFT.—If I recall the figures aright, the third rail construction costs us about \$3,000 a mile, which includes the cost of the third rail, bonding of the rail, cables at the grade crossings, and bonding of the surface rails, which I believe is about one-half the cost of the overhead construction at Nantasket.

Municipal Ownership and Operation of Street Railroads.*

BY P. P. SULLIVAN,†

[The first part of this paper deals with the extravagance and corruption in municipal administration in American cities, while the second part, from which the following extracts are taken, is intended to show that municipal ownership and operation abroad are the exception rather than the rule, and were the reverse true and such ownership and operation successful from a financial point of view, it does not follow that American cities could or should follow such examples or that if they did so, success would result.]

According to the returns of street and road tramways to Parliament, July, 1896, there were 153 distinct street railroad undertakings in Great Britain and Ireland.

Of this number Glasgow is the only city wherein the undertaking may fairly be called successful, and with reasonable economy it could not well be otherwise than financially successful. For a population of over 800,000 Glasgow has only 73 miles of tracks, whereas St. Louis, with a population of less than 700,000, has over 335 miles of tracks. It does not follow, therefore, that if the government of St. Louis was conducted equally as well as the government of Glasgow, that it could also operate the street railway system of that city successfully financially.

The city of Leeds had operated its street cars for nearly three years. The first year showed net earnings of approximately \$15,000, less than 1 per cent. upon the capital invested, whereas private capital earned and paid seven per cent. the previous year. The second year showed net profit of \$35,000, not quite the interest upon the sinking fund. And such results, too, with a population of nearly 15,000 per mile of track.

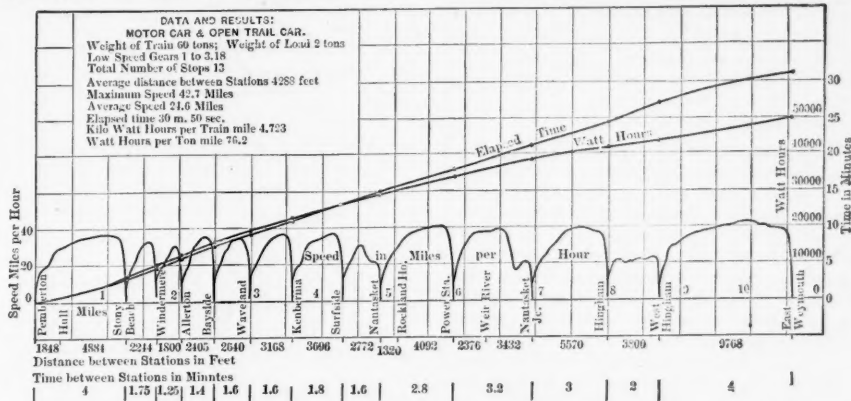
Previous to the acquisition of the street railroad by the municipality of Sheffield in July, 1896, private capital received from five to eight per cent. dividends from the operation of the property. Under municipal management there was a loss the first year, not even earning the interest upon the capital invested. And such results in a city which has over 17,000 persons per mile of track.

Huddersfield is the first city in England to attempt the operation of its street railroad, and for the 14 years which it has operated the property there is a loss of \$311,000, varying from \$3,300 to \$83,000 in a single year.

* Extracts from a paper presented at the Niagara Falls meeting of the American Street Railway Association.
† General Manager, Lowell & Suburban Street Railway Co., Lowell, Mass.

This loss has been met by drawing \$105,000 from depreciation account and the balance by taxation, varying from one-ninth of a penny to five pence per pound. It may seem strange that the municipality should thus con-

years of age, receiving \$2.50 per week, are employed as conductors. Notwithstanding such conditions some of those cities have not earned the interest upon the capital invested. Does anyone suppose the American cities if



tinue to operate under such conditions. The fact is that Huddersfield is a manufacturing city and the non-property and small tax paying voters are in a majority.

operating street railroads could employ such conductors at such rates of wages?

In Germany there are only three cities which own and operate their street railroads, and two which own the tracks and lease them to operating companies. In France there are none.

The facts as they are before us are that there are few cities abroad which own and operate their street railroads with more or less indifferent results, and only one of which, viz., Glasgow, which can properly be called a financial success; and yet there are those who would have American cities, regardless of differences of conditions and institutions, plunge blindly into the acquisition and operation of 15,000 miles of street railroad tracks because Glasgow operates 73 miles successfully.

It seems to me that those who honestly advocate the acquisition and operation of street railroads by municipalities do not look below the surface. They find that an occasional city abroad does such things, and they immediately jump to the conclusion that we should do likewise. They do not study the conditions with respect to accommodations furnished abroad as compared with these in this country, the methods of administration there compared with these here, and the civil service abroad compared with ours.

In a previous paragraph I showed the difference between St. Louis and Glasgow. Below will be found a comparison of other cities of nearly the same population, taken from the *Yale Review* for May, 1897.

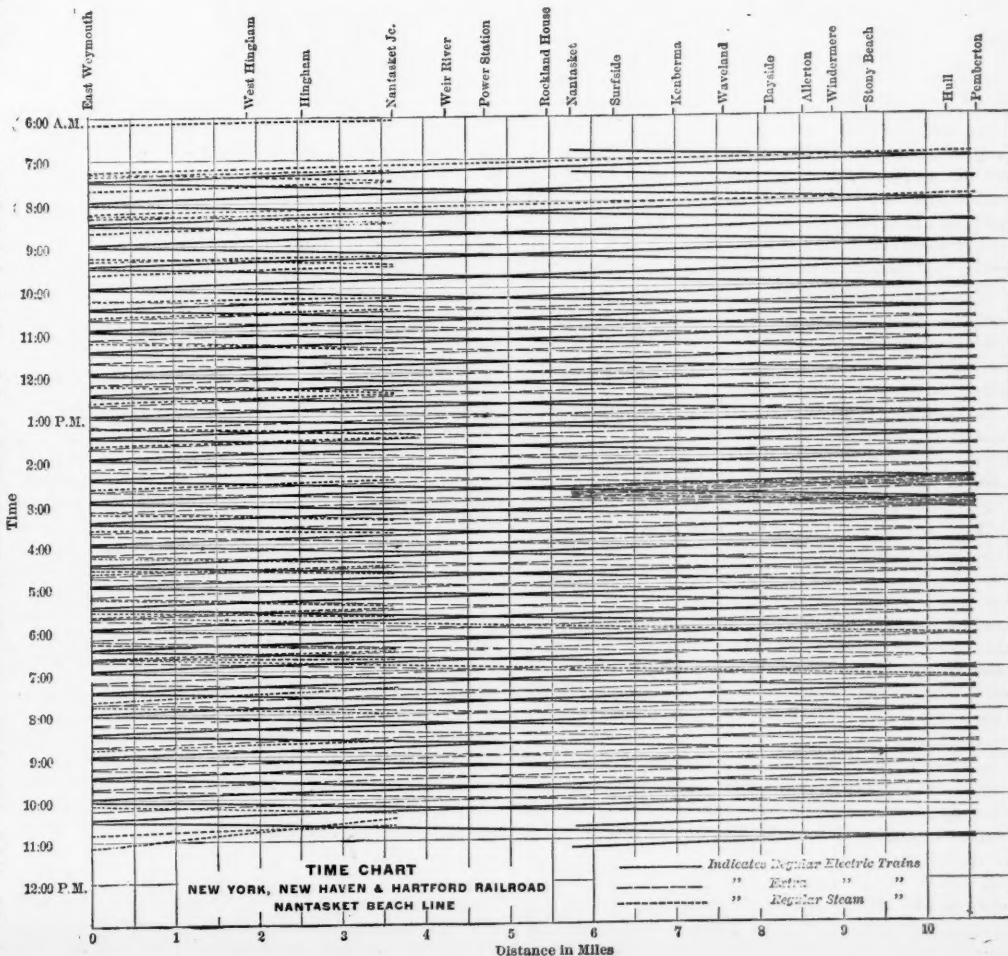
	Population.	Area in sq. miles.	Street railroad mileage.	Mileage per 1,000 population.	Mileage per sq. mile of area.
Birmingham.....	497,000	20	33	.966	1.65
Boston.....	494,000	37	295	.997	8.00
Edinburgh.....	289,000	14	21	.721	1.50
Detroit.....	300,000	23	262	.873	7.21
Leeds.....	400,000	31	27	.667	0.79
Cleveland.....	350,000	32	205	.585	6.40
Liverpool.....	611,000	21	66	.103	3.14
St. Louis.....	644,000	62	216	.320	3.50
Manchester.....	530,000	20	54	.102	2.70
Baltimore.....	512,000	34	262	.511	7.70
Bradford.....	228,000	17	21	.091	1.23
New Orleans.....	250,000	40	169	.676	4.22
London.....	4,400,000	165	230	.052	2.19
New York.....	1,851,000	59	357	.203	6.05

Compare any one of the above foreign cities with an
(Continued on page 768.)

Fig. 5.—Rail Bond on T Rail.

In the last fiscal year there was a loss of \$5,430 in Plymouth. This city did not acquire the property voluntarily; on the contrary, the operating company intentionally forfeited its charter and abandoned the operation of cars.

The operation in Blackpool shows a net profit for four years of \$992 after paying interest and charging off to depreciation. And yet in Plymouth, Huddersfield, Sheffield and other cities in England, boys of from 14 to 16





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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The Accident on the Hudson River Railroad.

In most railroad accidents we can determine, sooner or later, and with a good deal of accuracy, the immediate cause, and the place where the responsibility should rest. In the case of the accident on the Hudson River Division of the New York Central, last Sunday morning, there is still great uncertainty as to cause and responsibility, and it is by no means sure that we shall ever know precisely how the accident occurred. We judge that the Railroad Commissioners of the State of New York will make a careful investigation and we hope that they will call in one or two engineers of such experience and judgment and reputation as will command the confidence of other engineers at least.

The bank went out, but whether or not it went out under the train or before the train got there nobody knows. A mass about 70 feet long and back to the center line of track went out, leaving a cavity with three sides nearly vertical. The depth of this cavity is not known as we write, but very likely it will be known before this issue is in the hands of the reader. Whether or not the bank slid out down to the rock; how deep the rock or hard pan is below the rail level, or what is the slope of the hard bed we do not know. Indeed it is probable that no man living knows, or can know, until the ground is carefully examined under the direction of skillful men. We have had an opportunity to look over the manuscript notes of Mr. John B. Jarvis, who built the road about 50 years ago, and so far as our examination went could find no mention of the way in which the fill at this place was made or of the depth or character of the bottom. The sea wall which has been mentioned frequently in the newspaper reports is a wall about 6 feet high which was built to protect the roadbed from the wash of the stream. It is not in any sense a retaining wall.

Pending an expert investigation it is quite unsatisfactory to speculate as to what happened and why it happened, but it is interesting to consider very briefly some of the theories. Within pretty wide limits any one of a number of things might have taken place.

There are officers of the road and officers of great experience and judgment, who think that something failed on the locomotive and caused a derailment and that the breaking away of the bank was consequent upon this derailment. It hardly seems probable that a derailment would have caused so large a piece of the bank to break away. Moreover, as we write the report comes that the engine has been raised and shows no failure that would have caused its derailment.

A theory advanced by some very intelligent and responsible officers is that some mischievous individual may have caused a dynamite explosion in the bank. Of course this would account for the starting of the breach.

Another theory is that the bank failed as the culmination of the action of the water for an indefinite time. It is thought possible that there was some pocket or stratum which had been disin-

tegrated and more or less of the material washed out and that the exceptionally high tides which had prevailed during the last four or five days immediately before the accident had given the final stroke to this process.

We venture the opinion, subject to the information to be gathered by engineers, that there was a slip on the underlying strata, which by bad luck happened to coincide with the passage of a train, and which was of such magnitude that it could not have been provided against by any practicable construction or location. The dip of the country rock is very steep, and the geological formation is probably about the same as that at the Tilly Foster and other neighboring mines, 10 to 15 miles away, and the dangerous history of these mines has made them famous among engineers.

Naturally, the officers of the company feel the keenest interest in knowing, as accurately as they can know, precisely what did happen, for it is important that they should know whether or not other occurrences of this sort are likely to take place along the line of the Hudson River and what precautions should be at once taken to guard against such occurrences. Consequently, an investigation of the ground is in progress by the company, quite apart from that which the Railroad Commissioners will make, and we may feel confident that this investigation will be thorough. Until the results of it are known any theory of the accident must be after all conjectural. But every intelligent reader of the *Railroad Gazette* will assume that reasonable care and vigilance had been used, until he has thoroughly responsible evidence to the contrary. The bank has stood for 49 years, and officers of the road who have known this spot for 43 years assure us that there has never been any sign of any movement of the bank.

Some Notes on a Butting Collision.

The worst two collisions in our September record, which is given in this issue, were due to forgetfulness or recklessness or both, and they have been the subject of considerable newspaper discussion. Some phases of this discussion were touched upon in our issue of September 17. Daily newspaper views are, however, of little interest from a strictly operating standpoint, and the views of railroad officers are of more immediate consequence. As the mental defects mentioned sometimes cause disaster where trains are run by space intervals, some officers have decided opinions on cases like these, and they—officers who think the block system is unduly expensive—cite them as arguments in favor of sticking to the less costly time interval. If enginemen will run past a red train order signal they will do the same with a red block signal; if a man is reckless under one plan it will not change his nature to try to work him under another.

These arguments are not without weight, but the two examples should be considered separately. In the Newcastle case the coroner's report simply says that the conductor and engineman of the freight attempted to reach Newcastle on the time allotted by the despatcher to the passenger train. This, on its face, indicates recklessness; but as we have no further details we will not attempt to interpret the statement. Any man who "attempts" to encroach upon the time of another train is pretty sure to be found amenable only to that kind of discipline which quickly disciplines him out of the service; and his presence in the train service is a blot on the reputation of the officer who placed him there.

The Emporia case is plainer. A train ran past a red train order signal. It was just after dark and the claim was made that the light in the signal was not bright, but the officers of the road do not seem to give any weight to the claim. There were two engines on the train, but whether the second runner was held equally culpable with the first we do not know. Now, it is asserted that men who will make such a blunder as that will do the same with a block signal, and that even the electric headlight would be of no avail as a preventive of collisions. It seems to us that this assertion can be shown to be weak, without searching very far for evidence. We do not wish to deter anyone from employing the very best discipline possible, and if the training of enginemen, or the selection of firemen, or the detection of derelictions can be better carried out when it is known that the uncertainties of the flagging system are to be dealt with, we shall not quarrel with any one who prefers to take that way to stimulate himself to do his duty, any more than we should with the one prominent road in the country that refuses to adopt duplicate telegraphic train orders. That road makes a good record of freedom from collisions, and those who advocate duplicate orders must, therefore, be pretty moderate with their criticisms, though

they will still adhere to the duplicate plan as the safer of the two.

Railroads adopt the block system primarily for the purpose of more surely preventing rear collisions than can be done by any practicable plan under the time interval. Where trains are numerous, the argument in favor of this is unanswerable. Where they follow one another at very long intervals it has less force, and where the number of trains is midway between the two extremes the question may be debatable. But, the block system once adopted for preventing rear collisions, butting collisions are guarded against incidentally. Block operator A, in seeking from B information as to the last preceding train from A to B, clearly advises B that he also wants to know whether any train moving in the opposite direction is in or near the section A B. This request may not be expressed, but it is so clearly implied that it is practically just as effectual. This is an effective provision against dispatchers' errors, and errors of conductors and enginemen, such as "forgetting all about the other train," or misreading a schedule in the time-table.

Then, again, block signals compel attention more effectually than train order signals because they oftener give a stop indication. Where operators are not required to clear train order signals after trains come in sight of them, this is an important consideration; where they do clear the signal in sight of the engineman, the block system still has an advantage, as the number of stops which the engineman cannot plan for beforehand, by guesswork, is increased. And the stopping of trains at block stations instead of at chance places along the road, when made habitual, helps very greatly to train all enginemen to stop for a signal without question, and to train out of them the old idea that they need stop only when some obstruction of the track can be seen with the eye. It seems fair to claim, therefore, that space-interval regulations, when men have become habituated to them, will tend to prevent such blunders as that at Emporia.

To claim that men* who failed to see a red train-order signal would be equally oblivious to the rays of an electric headlight, facing them, is to claim that a candle is equal to a 50 C. P. lamp or that the aurora borealis is no more noticeable than the ordinary lights of a village street. An arc lamp, uncolored, is several times more conspicuous than a common oil-lamp with a red bull's eye, and an arc lamp with a headlight reflector behind it is many times more effective than one without a reflector. On a straight line the headlight would compel the attention not only of the engineman but of any person on the engine looking ahead, and miles away if on a level road; and on a hilly or curved road the illumination of the dust in the sky would make a striking appeal to the eyes of anyone looking in the direction of the coming train. We do not know enough about the Atchison line in the vicinity of Emporia to say that electric headlights would have prevented this collision, but it is safe to say that if such a light had faced the negligent engineman it surely would have arrested his attention if he was not asleep; and we have heard of cases where the light had a reviving influence on enginemen who were very nearly if not quite unconscious from drowsiness.

Of course we do not argue that electric headlights should be the main reliance for preventing butting collisions. The arc headlight must justify itself on some other basis than that. Neither do we advocate the use of the block system as a substitute for good discipline, although it has doubtless been adopted in some cases for that purpose. There appears to be evidence that on some roads it has been adopted as the most feasible means of reducing the losses from rear collisions down to a percentage which other roads claim to have accomplished without going to the expense of employing block signalmen. It is hard to see what excuse there is for poor discipline on any road, whether trains are run by space interval or time interval.

As regards forgetfulness of well-understood orders, or to look for a signal that is within plain sight, it is very rarely that we hear of a slip of memory of this kind which is not at least partially explainable. The cases in which the difficulty can only be attributed to some mysterious action or state of the brain which no amount of training in correct habit will cure, are very hard to find. It is true that as far as published explanations are concerned, the mystery argument is

* By the way, we do not know that the use of the plural "men" in this connection is accurate. The blunder has been characterized as peculiarly deplorable because four men simultaneously missed the red light; but it is quite likely that three of them—at any rate, two, the firemen—excuse themselves on the plea that it was not their duty to look for the light. We observe, however, in a Topeka paper, the statement that the conductor of this train has been dismissed; a fact which indicates that, possibly, the neglect of some other duty than observance of the train-order signal has to do with the failure to stop at Lang.

very common; but in conversing with superintendents who personally investigate blunders of engineers we almost always find some explanation. In this Emporia case there were two engineers and two firemen (two engines) on the westbound train; they knew the road, their past records were good, they were not tired from overwork and the case seems inexplicable; nevertheless, judging by our past experience, we risk very little in asserting that the superintendent or trainmaster or whoever knows the men and all the facts could tell at least one and perhaps several points on which the negligent engineers could, by changing their habits, effectually guard against such a blunder in the future. It must be remembered that we are not considering anything like a case of simple heterophemy; nor is it a failure like that of the engineer who finds a dingy switch target all right for his train a thousand times, and who therefore neglects to look at it the 1,001st time. Train order signals are more conspicuous than switches, there are fewer of them and they are not uniformly "all-clear;" and this case was after dark, when the red light made the signal distinct from every other object. We shall not set down this engineer's case as incurable without further evidence concerning his habitual way of dealing with train order and other signals.

September Accidents.

Our record of train accidents in September given in this number includes 77 collisions and 70 derailments, a total of 147 accidents, in which 72 persons were killed and 165 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two.....	19	0	0	19
Misplaced switch.....	2	0	2	4
Failure to give or observe signal.....	1	1	1	3
Mistake in giving or understanding orders.....	0	4	0	4
Miscellaneous.....	7	5	5	17
Unexplained.....	12	7	11	30
Total.....	41	17	19	77

DERAILMENTS.

Broken rail.....	2	Derailing switch.....	2
Defective bridge.....	2	Runaway train.....	2
Defective switch.....	2	Bad switching.....	1
Defective frog.....	2	Too quick application of air-brake.....	1
Broken wheel.....	1	Animals on track.....	4
Broken axle.....	7	Sand drift.....	1
Broken truck.....	2	Malicious obstruction.....	2
Fallen brakebeam.....	2	Accidental obstruction.....	3
Boiler burst.....	1	Unexplained.....	23
Broken car.....	2		
Ruptured brakehose.....	1		
Misplaced switch.....	4		
Open draw.....	1		
			70

OTHER ACCIDENTS.

None.

Total number of accidents..... 147

A general classification shows:

	Collisions.	Derailments.	Other accidents.	Total.	P. c.
Defects of road.....	0	8	0	8	5
Defects of equipment.....	19	18	0	37	26
Negligence in operating.....	28	11	0	39	26
Unforeseen obstructions.....	0	10	0	10	7
Unexplained.....	30	23	0	53	36
Total.....	77	70	0	147	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Passenger.....	37	17	0	54
Freight and other.....	40	53	0	93
Total.....	77	70	0	147

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accidents.	Total.
Killed:				
Employees.....	31	8	0	39
Passengers.....	14	2	0	16
Others.....	5	12	0	17
Total.....	50	22	0	72
Injured:				
Employees.....	50	18	0	68
Passengers.....	35	43	0	78
Others.....	7	12	0	19
Total.....	92	73	0	165

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured.
Defects of road.....	1	11	1	3
Defects of equipment.....	1	32	1	4
Negligence in operating.....	14	35	31	53
Unforeseen obstructions and maliciousness.....	0	0	6	6
Unexplained.....	0	0	0	2
Total.....	16	78	39	68

Twenty-seven accidents caused the death of one or more persons each, and 30 caused injury but not death, leaving 90 (61 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with September of the previous five years shows:

	1897.	1896.	1895.	1894.	1893.	1892.
Collisions.....	77	45	50	47	77	103
Derailments.....	70	64	54	91	75	84
Other accidents.....	0	7	4	8	6	6
Total accidents.....	147	116	108	146	158	203
Employees killed.....	39	30	25	30	32	68
Passengers killed.....	16	24	13	30	47	25
Others killed.....	17	70	53	84	101	110
Employees injured.....	68	109	126	42	99	125
Passenger trains involved.....	53	33	42	61	59	74

Average per day:

Accidents.....	4.90	3.87	3.60	4.87	5.26	6.77
Killed.....	2.40	2.13	1.27	1.67	2.63	3.10
Injured.....	5.50	5.97	5.97	4.20	6.67	7.83

Average per accident:

Killed.....	0.49	0.47	0.35	0.34	0.50	0.45
Injured.....	1.12	1.54	1.65	0.86	1.26	1.15

We have to report to-day a larger number of persons killed than in any September since 1893, and larger than in any month since that time except one. Thirteen passengers were killed in a single collision, that at Newcastle, Col., and there was another collision, that at Emporia, Kan., which was nearly or quite as disastrous as Newcastle, though the majority of the victims were trainmen, no passengers being killed. Some notes on the causes of these collisions may be found in another column. There were four other butting collisions in September reported as due to disregard of telegraphic orders or failure to observe signals, making six in all; a record which serves to remind us that the causes of these collisions are not yet so well understood that they need no further discussion, albeit the record is not nearly so bad as it was five years ago. A fast train had a disastrous collision at Newark, N. Y., on the 15th, but all the persons on the train, except the engineer and fireman, escaped serious injury. Another passenger train collision, which was serious, considered in relation to its cause, was that at New Haven, Conn., on the 29th, and there was another in which "air brakes failed to act" at Port Jervis, N. Y., on the 24th.

The most fatal freight train accident was the derailment at Hanson, I. T., where seven men were killed and six others badly injured, the whole 13 being farm laborers, seeking new fields of labor, who were secretly riding in a freight car. This instance is a reminder that a considerable share of the very numerous ride-stealers all over the country are something other than confirmed tramps. That many of these trespassers have money is also indicated by the recent report that 20 or more freight brakemen of the Missouri Pacific had been dismissed for accepting money for freight-car rides; and every now and then we read of robberies, and even murders, of one class of ride-stealers by another.

The number of smash-ups due to trains breaking in two was large in September, being 19, almost two and a half times as great as the average monthly number for the past three years. As freight traffic was heavy all over the country in September it is quite possible that the number of these accidents, in proportion to train mileage or car mileage, was no larger than before; but the record is bad enough in any event. As every one knows who has read the recent Master Car Builders' discussions, the money loss from this cause is much more—probably many times greater—than is indicated by the number of cases getting into our record; and as the number of very powerful locomotives used to haul freight trains is constantly increasing, the record is likely to grow worse instead of better, unless the couplers and draft gear of all cars are kept at the very highest standard.

The number of electric car accidents in September was eight; three rear collisions and two butting, and three accidents from careless running. One employee was killed and 30 persons were injured. We have found no less than five highway crossing accidents in September, in each of which two or more persons in carriages were killed, the total killed being 13; and in one case reported since the end of the month (Oct. 4), six were killed at a single stroke. In each of two cases in September three sectionmen on a hand car were killed by being struck by a locomotive.

Norwegian Railroads.

At the end of June, 1896, Norway had 1,088 miles of railroad. Of this 453 miles were of 4 ft. 8½ in. gage, 619 of 3 ft. 6 in., and 16 of 30-in. gage. The length owned and worked by private companies was only 69 miles; the remainder was worked by the state, which, however, was the exclusive owner of only 30 miles. The lines are chiefly owned by a sort of copartnership of individual capitalists, municipalities and the state. The country has an area about equal to that of New England, New York and New Jersey together, but less than 1,000 square miles of this area is cultivated, and the population is largely on a narrow belt between the long sea coast and the high mountains, and the forests and fisheries are the chief resources of the 2,000,000 inhabitants. The configuration of the country has caused the railroad system to be formed chiefly of short lines, and any considerable through traffic is impossible. At the middle of 1896 the railroads had 260 stations, or one to every 4.2 miles of road; to every 7,650 inhabitants, and to every 478 square miles of territory—the larger part of the territory being uninhabited mountain.

The aggregate cost of the Norwegian railroads has been \$39,329,790, or at the rate of \$36,150 per mile, which is, perhaps, the lightest average of any country in the world; against which it must be considered that it is essentially a light railroad system. This average is about equal to the capital per mile of the Chicago, Milwaukee & St. Paul, or the Chicago, Burlington & Quincy, either of which has five times the mileage of the Norwegian system, and an enormously greater equipment and capacity for carrying traffic; but is a country much easier to build over.

The part of the cost of the Norwegian railroads contributed by the state amounts to \$27,986,978, or more than seven-tenths of the whole, on which its share of the profits last year amounted to four-fifths per cent.

On the roads worked by the State (1,019 miles) in the year ending with June, 1896, the passenger traffic was equivalent to 118 persons moved each way daily over the whole mileage, the average journey being about 14 miles. Only one passenger in a thousand rode first-class, and 92.7 per cent. of the whole number went third-class; but the average journey of the first-class passenger was 107 miles, of the second-class 25.6, and of the third-class 12.9 miles. The ton-miles amounted to only 61,608,000—equivalent to less than 79 tons each way daily, say three carloads. One of our modern American through trains could haul this traffic with one train in a fortnight.

The earnings of the Norwegian state roads came almost equally from passengers and freight, and amounted to \$2,363,073, or \$2,319 per mile, 78.2 per cent. of which went for working expenses, leaving \$505 net per mile, which is 1.43 per cent. on the capital.

On what is called the Norwegian Main Line, a private road, but only 43 miles long, the traffic was so heavy as to yield \$11,880 gross and \$5,334 net per mile, which was a little more than 7 per cent. on the cost.

The little 30-in. gage road, 16½ miles long, opened July 1, 1894, carried 62,722 passengers and 1,150 tons of freight, earned \$335 gross per mile, and its working expenses were \$9,092 greater than its earnings.

There are doubtless railroads in this country with just as light traffic and earnings, but nearly all are members of great systems, and the results of their operations are hidden in the grand totals. Reports of the traffic, earnings and expenses of the numerous lines which we were building so eagerly some ten years ago in Western Kansas and Nebraska, etc., would doubtless prove very interesting reading, though painful to investors, but these lines have this in favor of them, that the traffic developed on twenty or a hundred miles of new line on the frontier, however unsatisfactory in itself, adds to the traffic and profits of perhaps a thousand miles of old road which gives the new line an outlet. There can be nothing like this in Norway.

Professor Bürkner, in his lectures in the clinic for ear diseases at Göttingen recently, referring to the numerous railroad accidents that have occurred in Germany of late, said that it is probable that many were due to imperfect hearing on the part of railroad employees. While large classes of employees have their vision tested periodically, and often also their hearing, yet deficiencies in hearing capacity occur among them frequently which are not detected by these examinations. Many who suppose their hearing to be perfectly good, by careful testing are found to have very serious defects. By reason of this general self-deception, no faith should be put in a man's own statement that he hears well with both ears. The practical investigation of the sense of hearing demands such a mastery of the various methods used as can hardly be required from the ordinary physician. The professor said a great part of the trainmen, and particularly of the engineers, after a relatively short term of service, no longer possess normal hearing, though many of them may still be fit for service. An adequate acuteness of hearing is of the greatest importance, not only among trainmen, but track guards and switchmen; these and others should have good hearing in both ears. A man had of hearing in one ear has great difficulty in determining from what direction a sound comes. The safety of travelers and of the employees themselves, said the professor, require that far more attention be paid to the ears of railroad men.

The number of fatal accidents to persons on or about street cars in New York City, in proportion to the population, is gradually decreasing, according to a paper by Mr. William J. Clark, in the *Street Railway Journal*. Mr. Clark makes elaborate analyses of accidents from various causes, in the city, for a series of years, including sunstroke, suicide, drowning, suffocation, etc., by which he shows what a small ratio street-car accidents bear to the total of all kinds. For the five-year period, 1872-1876 the total number of fatal street-car accidents in the city was 43, or one to every 23,771 of the population. In subsequent five-year periods the total number decreased materially, and in the last, 1892-1896, the total was 47 and the ratio one to 33,675. It is shown that there are two or three times as many fatal accidents connected with ordinary vehicles (carriages and wagons) as there are with street cars. The ratio of accidents on street cars to the number of passengers carried is steadily decreasing. In 1887 it was one to 1,370,325; in 1896 it was one to 1,941,822. This includes both fatal and non-fatal accidents. The damages paid by street railroad companies of New York City on account of accidents in 1887 amounted to \$107,004. Payments on this account have steadily increased, and in 1896 amounted to \$218,732. This increase has been more rapid than that in the number of accidents, the car miles, or the number of passengers carried.

The Russian engineering parties who are surveying in Manchuria for the Chinese Eastern Railroad, which is to connect with the Siberian Railroad, have been attacked by organized bands of robbers, whose ordinary field of industry is among gold miners in that country. The Chinese government is said to have requested the Russian authorities to bring their troops over the border and chastise these marauders, and accordingly the work on the railroad is now prosecuted under the guard of Russian Cossacks and chasseurs. This has pleased China so much that the Foreign Office has sent the Russian commander the order of the double dragon.

Some ill-natured people, skeptical as to Russia's unselfishness, hint that it will probably be a great while before the soldiers leave Manchuria.

NEW PUBLICATIONS.

A Treatise on Arches. By Malvered A. Howe, Professor of Civil Engineering, Rose Polytechnic Institute. New York: John Wiley & Sons. London: Chapman & Hall, Limited, 1897; 8vo: 344 pages, with appendices, tables and index. Price, \$4.

On opening this volume after the usual preface and introduction the first thing that attracts the attention is the "nomenclature," or the symbols used in the various formulas. The student will be somewhat taken aback to find that this occupies nearly five full pages, it requiring most of the letters of the alphabet, both capitals and lower case, with various subscripts and affixes, as well as a number of Greek letters, to designate the quantities used in the equations. It is found on further investigation that a large part of the book is filled with deduced and derived equations, and that there is little explanatory text. No definitions of the terms employed are given, and the student must necessarily acquire the principle of the subject from a more elementary text book. When familiar with the symbols used, however, the application of the formulas is a comparatively easy matter. All those likely to be needed in practice are collected in simple form in Chapter II., and though this occupies 32 pages, the formula fitting any case can be much more readily found than if they were only given at the end of each demonstration. The numerical work is greatly lessened and facilitated by the tables at the back of the book giving tabulated values of constants.

This book, which is one of the most extensive American works on the subject, is based upon four fundamental equations demonstrated by Wyrach in 1879, and from these have been deduced formulas for all practical cases. A number of new formulas have also been introduced. The arches are of the various hinged and non-hinged types and are subjected to vertical and horizontal loads and changes of temperature. Parabolic arches having moments of inertia varying according to a constant relation are first considered. Circular arches are treated next. After this, symmetrical arches having a variable moment of inertia, are discussed, and general formulas are deduced which can be applied to any symmetrical arch, either fixed or hinged, and subjected to either vertical or horizontal loads. In some cases the reduction of the integrals to a simple form would be complicated or even impossible, and for such cases formulas are given in a summation form. The application of these requires considerably more work, and, not being exact, they are not so desirable as the integral form when applicable; but they have the advantage of being approximately correct for any form of arch and any values of the moment of inertia of the arch rib. To illustrate the degree of accuracy of the summation method, the values of the horizontal components of the reactions and the bending moments at the supports—the principal quantities to be determined—are calculated for a few cases by both methods, and it is found that those given by the approximate or summation form are sufficiently accurate for all practical purposes.

The effect of the axial stress, which is usually neglected by American authors, is fully discussed, the formulas in nearly every case being deduced both with and without it. A number of examples are solved by both sets of formulas and a comparison made of the results. It is found for arches having a rise of one-fifth or more of the span that the common formulas are fairly accurate when the loads act vertically, but for flat arches they give results six or seven per cent. too large. For horizontal loads, however, the common method gives results much too large. If the rise is less than one-fourth the span they are about 30 per cent. in excess. But as these loads are usually caused by wind, and the stresses produced consequently small in comparison to those due to dead and live loads, the common method is probably accurate enough for all practical purposes. In the "History of the St. Louis Bridge," by Prof. C. M. Woodward, the effect of the axial stress in determining the stresses was omitted. It is shown that this gives the horizontal component of the reaction, or thrust, too large, and should be divided by 1.19 to give the true value. There is also considerable difference in the values of the bending moments at the supports, but the greatest differences occur when the load is so placed that it produces small and non important results.

A comparison is made of four types of arches and the relations between the values of the outer forces shown graphically. The types are: 1, without hinges; 2, one hinge at center; 3, two hinges; 4, three hinges. The first appears to be the most economical for dead and live loads, but the stresses due to temperature are the greatest. For structures carrying moving loads the second and fourth types are not desirable on account of the vertical vibration. A further comparison is made of the first, third and fourth types for a railroad bridge of a 416-ft. span, and the maximum stresses due to dead load, live load, wind and changes of temperature are shown graphically. The relative weights of the three types are given as 1.00 for the first; 1.21 for the third, and 1.30 for the fourth. This indicates that for large bridges the first type is most economical. If there is no moving load, as in a roof truss, the fourth type is the most economical, and it has also the advantage that the stresses are the most easily determined of any arch.

Some interesting information is given regarding

masonry arches, and some methods of rendering the determination of the stresses more exact are shown. Chief of these is Alexander and Thompson's method for designing segmental masonry arches, and several examples are solved to illustrate its application.

The results are given of a very interesting series of tests, made by the Austrian Society of Engineers and Architects, upon arches of 75.4-ft. span, and also on small floor arches. These tests confirm modern theories.

The appendices and tables fill 84 pages and contain reductions of integrals used in the various formulas, the solution of special cases, tables of constants, etc. There are also given in tabulated form the most noted arches that have been built with data relating to the same. These arches include those of masonry, cast iron, wrought iron and steel used for bridges and roof trusses. The value of these tables is unfortunately impaired by the data being lacking or doubtful in a few cases, but on the whole they are fairly correct. This information is usually hard to find at the desired moment and the tables will be a great convenience for those having poor memories for dates and figures.

The author has not the clearness of expression characteristic of the best writers of text books and as a text book the use of this work will probably be limited. It is, however, an excellent book of reference. It contains such valuable information that it cannot fail to be of interest to many engineers and is a worthy addition to the literature of the profession.

Tables for Earthwork Computation. By C. F. Allen, M. Am. Soc. C. E., Associate Professor of Railroad Engineering, Massachusetts Institute of Technology. Boston: Published by the author. New York: D. Van Nostrand Co. Price, \$1.50.

Professor Allen copyrighted these tables in 1893 and printed a small edition of them at that time. Within a few months he has put them in the hands of the D. Van Nostrand Company for publication, and he explains that the book has been prepared for those engineers who prefer tables to diagrams. Of these tables there are three. The first is a table of triangular prisms adapted for rapid computation for sections of any base or slope and for irregular as well as regular sections. Table II. is prismoidal corrections to be applied to the results taken out by Table I. Table III. is a table of level sections for rapidly taking out quantities when the center heights alone are given.

Table I. gives the quantities in cubic yards for lengths of 50 ft. and heights from one-tenth of a foot to 50 ft., varying by tenths, and for each integer of width (16 to 9), so that any width of base may be computed by change of the decimal point and adding. Table II. gives the quantities for a section 100 ft. long and for D_0-D_1 from 1 to 25, varying by tenths. Table III. gives level sections for base 14, 16 and 20 and slopes $1\frac{1}{2}$ to 1 and 1 to 1 in each case. Center heights are given for single feet 1 to 50 and for tenths.

The tables fill but 21 pages and 12 pages are given to a brief but clear explanation of their use, illustrated by examples. These tables are all well arranged and printed for reference; the quantities in the vertical columns are divided into groups of five and the type is large and clear. In compactness and elegance of arrangement these are the best earthwork tables that we remember to have seen.

TRADE CATALOGUES.

Asbestos Magnesia Steam Pipe and Boiler Coverings.—The Philip Carey Mfg. Co. has recently issued a pamphlet describing insulating coverings. These are of many kinds suited to various uses, such as asbestos-magnesia molded covering for high pressure steam pipes, wool felt covering for hot water pipes, combination asbestos and felt covering for low pressure steam and hot water pipes, a special wool felt covering for steam pipes in wet mines and other damp places, a special covering for ammonia and brine pipes, and protection for many other purposes. The pamphlet is accompanied by a drawing which shows the method of applying the asbestos-magnesia block lagging made by the company and attaching the Russia iron jacket to locomotive boilers. The prices of most of the articles described are included in the catalogue.

The Corn Belt, published at 209 Adams street, Chicago, at 25 cents a year, is now in its fourth volume. It gives a large amount of interesting information, concisely stated, concerning farm lands and the farming industry in Missouri, Nebraska and other states traversed by the Burlington road. It is essentially an advertising sheet published by the passenger department of the Chicago Burlington & Quincy, but the facts are presented with such good taste, and so impartially, that the paper deserves to be considered on its merits. Much of the matter concerning the farms is in the shape of letters from the farmers themselves, which abound in statistics and much accurate information about actual life on farms in that region. There are numerous direct process pictures. The paper contains a special article each month during the season on the corn crop, made up from the letters of over 500 correspondents.

Star Brand Blocks.—The Boston & Lockport Block Co., of 142 Commercial street, Boston, Mass., has recently issued an illustrated catalogue and price list of many blocks of special design which are now upon the market. The company are making a specialty of metaline, self-adjusting five-roller bushed wrought iron, steel and

wooden blocks, Batt's patent differential hoists, Loud's patent diaphragm pumps, wire rope blocks and sheaves and warehouse trucks, which are included in the contents of the catalogue. Besides these, trucks of every description are illustrated and a price list appended. The results of tests upon the different blocks are given, adding to the value of this catalogue. It is well bound and printed on good paper, and will be sent by the company on application.

The London & Northwestern Railway has issued from its New York office for its American passengers a new folder in which, beside the large map showing the lines of the company in England and Scotland, there is a condensed map showing the connections with the railroads of America. By squeezing the Atlantic Ocean down to about the size of the Irish Sea, the steamship connections from Montreal, Boston, New York and from Western cities to Queenstown, Londonderry and Liverpool are very clearly shown. The front cover of the folder has a picture of the Liverpool landing stage, from which trains of this road take passengers direct to London. This folder has much information in small compass. It gives fares to principal European cities in United States money.

Detroit Lubricating Co.—We have received from the Detroit Lubricating Co., of Detroit, Mich., a 43-page 6 x 9 in. catalogue illustrating and describing in detail the different kinds of feed lubricators and other oiling devices made for stationary engines, hoisting engines, steam pumps, gas engines and air compressors. The catalogue contains data and a full price list which should interest all users of steam as a motive power. The catalogue will be sent on application.

Axle Light.—The National Electric Car Lighting Co., 30 Broad street, New York, and Monadnock Block, Chicago, issues a very small book of rules for the government of employees in charge of light installations. This covers operation, inspection and renewals. It includes also a brief general description of the system used by this company. Electricians and others interested in the possible application of axle lighting will be interested in the rules.

Municipal Ownership and Operation of Street Railroads.

(Continued from Page 765.)

American city of the same population, and you will find that the area of the latter is greater and the street railroad accommodations greater in proportion than the former. The English cities average over 15,000 persons, and the American cities over 2,600 for each mile of track. And yet there are those who would state that because Leeds could operate 27 miles of track successfully, that Cleveland with nearly the same population and area could also operate 205 miles of track, nearly nine times as many miles of track, also successfully. If, therefore, the methods of civil service and administration were the same in both cities, Leeds could be eminently successful and Cleveland a monumental failure.

The experience of France and Brazil with government ownership of railroads is not encouraging to the advocates of the idea that railroads should belong to the people at large, and should be operated by officers appointed by the government. The South American republic has determined to abandon state ownership of railroads, after a thorough test of the theory, and is now negotiating with European capitalists for a lease of the entire system, comprising 14,000 miles of track. When Brazil took charge of the Central Railroad, that corporation has paid as high as nine per cent. dividends, but under government control it has not only failed to earn its expenses, but has cost the people \$2,000,000 or \$3,000,000 a year above its receipts.

The experiment of state ownership of railroads has been tried longer in France than in Brazil, and under more favorable conditions. The model road there runs through well-populated districts, with large cities as terminals, but the results in France are discouraging. Eighteen years ago a railroad system was constructed, which was to furnish cheap rates for passengers, cheap freight for shippers and abundant profit for the state. It has done none of these things. At first the advocates of the enterprise insisted that only time was required to prove the wisdom of the project. Eighteen years have passed and the results may be briefly summarized. Theoretic methods have been abandoned, and the railroad is now managed substantially as are those in the hands of private capitalists, except its tariff of rates is a little higher, and its cost of operation is considerably larger. The last report shows that the net return on the whole capital expended is 1.35 per cent., and even the state cannot borrow money for less than 3 per cent. The government has every year a considerable deficiency to settle, and the people who use the line pay somewhat more than they would have done if the enterprise had been left to private capital.

Canada has had an experience of state ownership also, but upon a more limited extent. There the government owns about 10 per cent. of the whole, upon which it loses about \$500,000 annually.

The railroads and their equipments and fares of France and Germany, operated by the government, cannot be compared with those of England operated by private capital; and the manufacture of tobacco and cigars by the government of France has produced such vile stuff as to be an object lesson to enthusiasts of government monopoly.

Some of the advocates of changing the present state of things stop short at the operation of street railroads by the municipalities and advocate that the municipalities own the tracks and lease them to private capital. They are aware of the present condition of our administrations and dare not go the logical length of their position. If our municipalities are so unbusiness-like and corrupt in their methods as to be incapable of operating a street railroad properly then they are also unfit to manage the construction of the property and to make contracts for its use. You cannot stop half way.

The motive for public ownership abroad is twofold. The first has reference to the conditions of the streets. Cities have, as a rule, finely constructed and well maintained streets, and in their very proper regard for keeping them so they desire to control all construction and maintenance of tracks. The second has reference to

controlling and regulating the method of operation. That has proven a failure, and can be accomplished better when granting a franchise. In nearly every case in England where the municipality acquired the operation of the property it did so involuntarily.

The City of Toronto, Canada, is the only example in this country of public ownership and private operation. The conditions and contract there please the theorists and the street railroad company and all are happy. The municipality constructs the concrete bed for the tracks, supplies and does all paving, and removes all plowed snow. The compensation which it receives per mile of track is much less than that paid in some states by one company for running over the tracks of another company. Percentage of receipts, rates of fare, etc., should be looked upon as nothing more nor less than a premium for which the operating company receives a monopoly. Competition and the fear of it are completely shut out. Single fare and transfer carry a passenger only to the suburbs. Those going to and from the suburbs pay extra fares, and as the city grows in population, it will become as congested as foreign cities, or the people will be compelled to pay extra fares to get to and from suburban homes. Such conditions exist nowhere in the United States.

The conditions with respect to Toronto and its suburbs suggest a practical problem in the United States should municipalities desire to acquire street railroad properties. Usually abroad street railroads are operated within the limits of the municipality as at Toronto. Should the lines be extended further additional fares are charged. In the United States on the contrary, in nearly every instance the street railroad extends beyond the city or town limits and usually only a single fare is charged. Could a city obtain the street railroads within its own jurisdiction an interesting problem is opened with respect to the owner of the balance of the property; and in case the balance of the property should be acquired by the other towns through which the lines may be operated, as to division of "spoils" profits and losses. It may result as it did in Birmingham, England, in the price of gas. That city provides its own gas and charges suburban towns 50 per cent. more than it charges its city consumers.

Record Discipline on the Erie.

Suspensions of employees have been abolished on all the lines of the Erie Railroad, including the Chicago & Erie and the New Jersey & New York. The circular to employees reads:

1. On Nov. 1 the system of "Discipline by Record" for permanent employees will be put into effect on these roads. Discipline will be maintained by charges against employees' record or by dismissal from the service. While the past record of employees cannot be entirely ignored, hereafter an individual account will be opened with each employee in a book kept specially for that purpose in the Superintendent's office.

2. Such acts as disloyalty, intemperance, dishonesty, gross carelessness or serious offenses of like nature will, as at present, be considered a sufficient cause for dismissal.

3. A charge will be made on the Record Book for every case of neglect of duty, violations of the rules or regulations, accidents not meriting dismissal, improper conduct, etc. Instead of suspension (except for investigation) the employee will be allowed to continue at work. Employees found blameless under investigation will be paid for time lost, the same as at present.

4. No charges will be recorded against an employee without a thorough investigation and notice given to the person affected. This record will be a private one, and employees will not be shown any record therein except their own. A transcript of an employee's record will be given him on application.

5. When the record against an employee becomes such as to demonstrate his unfitness for the service he will be dismissed.

6. Special credit will be given on an employee's record, and may also be bulletined, for notably excellent conduct, good judgment in emergencies, loyalty, etc.

7. Record bulletins will be issued by the Superintendent from time to time, as may be necessary in the interest of discipline, on bulletin boards provided for that purpose. These bulletins will contain facts and conclusions and only such comment as is applicable. Names will not be mentioned in these bulletins; the chief object being educational.

8. Employees amenable to the rules of other companies will be subject to such company's form of discipline, and such record will be made against our employees as the offense may warrant.

9. Co-operation on the part of employees in this matter will be of great assistance in producing good results, and to this end correct accounts of mishaps occurring on the road should be furnished by the parties interested. We shall thus secure a higher state of efficiency by judging each case on its merits; enable the employee to gain in self-respect, in loyalty, watchfulness, and zeal for the employer's interest, and establish discipline in which the element of force is not predominant; become acquainted with such cases as may be bulletined, and learn from them the lesson that is taught by the failure of others; avoid loss of time and earnings; develop a feeling of confidence and security which will benefit and encourage the good men, while those who are habitually careless and indifferent will be dropped from the service.

The Oval Brakebeam.

The engravings show a brakebeam which has been designed and patented by the Oval Brakebeam Co., of Philadelphia, and which is now on the market. One of the engravings shows the regular, inside-hung brakebeam and the other the outside or body-hung beam with the application of the finger guard and safety chain device.

It is claimed for this design that, being elliptical in cross-section, it has great strength in all directions and that no truss rods are required. Also that when suspended it is evenly balanced and no chains or hooks are required to keep the brakeshoes in proper position. It is believed that owing to the shape of the brakebeam it is less liable to collect dirt, water, snow, etc., and that the injurious drippings from a refrigerator car are not so likely to stand on it and corrode it as on some other forms of metal brakebeams. The standard section from which these are made is rolled especially for this purpose and it is claimed that the thickness and distribu-

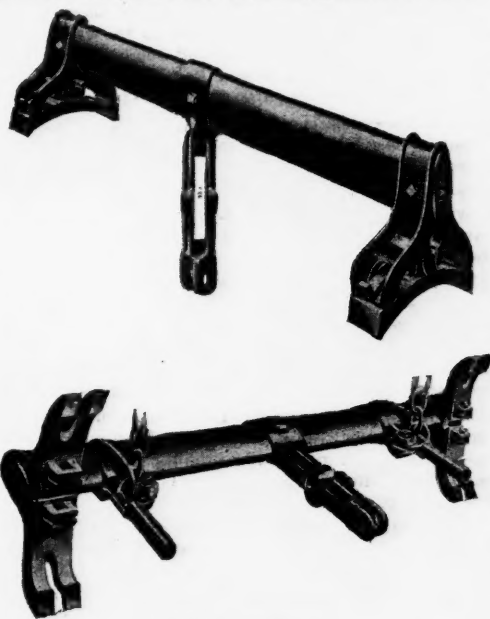
tion of metal are such as to give a lateral stiffness not possessed by other beams. Mechanical and service tests on passenger and freight cars and locomotives have given good results.

The G. P. A.'s Other Side.

At the annual meeting of the General Passenger and Ticket Agents' Association in St. Louis last week the address was by Mr. P. S. Eustis, of the Chicago, Burlington & Quincy. He intimated that the general passenger agent generally held too exalted an opinion of himself, and said, among other things:

"The addresses we have made to ourselves, though upon varied subjects, have customarily contained a very pleasant flattery. They have described the general passenger agent in high terms of praise, lauded his chief attributes, and set forth his magnificent achievements. For a change it would be wholesome for us to consider ourselves from a totally different point of view. A certain self-respect is commendable, but would not a little more modesty better become men, who, however, high-sounding their titles, are merely hired hands, employed to direct a business organized for the purpose of making money?"

"In no business do they so recklessly reduce the selling price of their goods and so carelessly ignore the cost as do



The Oval Brakebeam.

we. A very large part of the passenger traffic is handled at a loss. This criticism applies to those in the East as well as in the West, even to some railways that show a profit on passenger business, which, however, is not as large as it should be. Until the General Passenger Agent has exhausted every resource in his efforts to make the passenger business profitable it is with poor grace that he endeavors to explain why things are as they are.

"We give better passenger service in this country for less money than do the railroads in any other part of the world. The result is unprofitable. There are two causes for this bad showing, the over-expensive service rendered and the low price accepted for it. Who is to blame for the very expensive service? Surely not the traveling public nor the stockholder. We must, therefore, hold responsible either the Manager or the General Passenger Agent. Now is it not a fact that when the General Passenger Agent speaks of his troubles he will tell you that his hard-hearted Manager has so far refused to quicken the time of No. 1 three hours? Has he not refused to put five more expensive men in the field? Has he not declined to put on an additional train? Has he not failed to build new and more expensive stations, to put on new and more expensive equipment? In fact, is it not the Manager who stands between us and the annual expenditure of thousands of dollars? I know and sincerely admire the General Passenger Agent whose mighty brain conceives and consummate wit presents plans for the reduction of service and expenses on the other road, but where is he whose reckless Manager wants to spend a lot more money on a business already unprofitable? Who is the short-sighted Manager who will not permit the General Passenger Agent to withdraw from service trains that really do not pay, who insists that he shall continue expensive practices that do not bring adequate return in new revenue?"

"Now, as to revenue. The average rate is too low and that is a field in which the general passenger and ticket agent is the only expert. He cannot say that his manager has had such hand in the rates as to force him against his better judgement to make them lower than they should be. It has been said that the public is to blame for the low rate, legislatures having passed laws limiting the maximum rate at a lower figure than it should be. While there is some truth in this, I think we can dispose of the point by recalling the argument we have so frequently made to show that railways voluntarily reduce rates from time to time more than the legislatures do. True, the traveling public, often acting as a unit, as through a convention committee, for instance, make unreasonable demands upon the railroads, but these people are generally fair minded and will recognize the fact that a railway is organized for profit, and concede that the fare should not be reduced from \$30 to \$10, from \$1 to 50 cents, if the result is to be less net revenue from the business carried. It is not surprising that people so seldom consider that phase of the reduced rate question when it is so seldom presented to them, and when upon the merest suggestion there is always some one ready to offer even better rates than were asked.

"Travelers fully prepared and perfectly willing to pay the tariff price have often been surprised to find the transportation offered them for less, until it is now their common practice to 'shop' about in the belief that they may get the tickets they want for less than first price.

"Large sums are annually wasted in excessive commis-

sions, in advertising for transportation, in unnecessary reductions of rates for excursions and conventions, and in many other ways. The greater part of all this is to meet competition which does not always exist, and when it does might with profit be ignored. The annual outlay in transportation for advertising is enormous and that a proper value is not put upon it is quite evident when you talk to the up-to-date solicitor, who says, 'I don't want cash, I can take this in transportation.' He shows plainly that he thinks the transportation worth nothing to the railroad's, and he has our warrant for it.

"Much that we hear about the practices of our competitive neighbors is untrue, in whole or in part, and to meet the competition often results in more loss than there would be in ignoring it. Many of our independent actions, while entirely defensible of themselves, and apparently profitable, logically lead to somewhat like steps by our neighbors, until the effect has spread from practice to practice and point to point, finally coming back upon the original mover with disastrous effect. In such cases it is often hard to recognize the effect as the consequence of the original apparently innocent cause, but the railways of this country are so easily affected one by the other, and the movements of one so often lead to disastrous effects upon all, that it behooves the General Passenger Agent of this day to consult more the interests of his neighbor and refrain from independent action."

Exhibits at the Niagara Falls Meeting of the A. S. R. A.

In our last issue we gave the names of many of the exhibitors at the recent meeting of the American Street Railway Association. The following completes the list:

Charles E. Agard, Hartford, Conn.—The Agard swiveling door hanger for supporting and guiding sliding or rolling doors or shutters which are adjacent to the angles of the vestibule on street cars.

Albany Lubricating Compound & Cup Co., Albany, N. Y.—Samples of the Albany grease for lubricating purposes.

H. B. Camp Co., Aultman, O.—Samples of underground conduit for feeder wires for electric roads.

Central Union Brass Co., St. Louis, Mo.—Commutator segments, special line insulating materials.

Clonbrock Steam Boiler Co., Brooklyn, N. Y.—Model of the Morrin Climax water tube boiler and a number of large photographs showing installations of Morrin boilers in different parts of the world. One of these boilers furnishes all the power for the Tennessee Centennial Exposition at Nashville, and the company has received a contract to furnish a similar equipment for the Trans-Mississippi and International Exposition, to be held at Omaha, Neb., in 1898.

Columbia Machine Works, Brooklyn, N. Y.—Samples of electric railroad supplies, including commutators, dropped forged copper bars, trolley wheels, fuse boxes, bearings and car trimmings.

Dayton Automatic Car Switch Co., Dayton, O.—Model of car showing operation of an automatic switch which is moved by pushing a knob placed near the motorman's foot.

J. C. Dolph & Co., New York City.—Forest City protected rail bonds; assembled copper and mica segments for railroad motor commutators; rail-dropped and drop-forged commutator bars; all types of commutators for motors and other general supplies.

F. W. Darlington, Philadelphia.—Photographs of electric fountains of recent construction, including those in Brooklyn, Philadelphia and Chicago.

General Electric Co., Schenectady, N. Y.—In addition to the list of exhibits of this company given in our issue of Oct. 15, page 733, the following may be noted: New G. E. 37 motor, such as described and illustrated last week; two G. E. 52 armatures arranged to show armature construction; mica shown as used in motor construction; the K. L. Q. and M. types of circuit breakers with magnetic blowout; switchboard containing static ground detector; Thomson's inclined coil instruments of the portable and switchboard types; Thomson's arc ammeter; static ammeter; G. 2 static recording wattmeter for measurements of the output of a station; portable indicating wattmeters; pocket ammeters and volt meters. The company had its headquarters in one of the small parlors of the International Hotel, where an X ray exhibition was given. Platino cyanide of barium was used on the screen, which was 12 in. square.

G. E. Green, Niagara Falls, N. Y.—Insulating material and other supplies for high tension currents.

Hope Electric Appliance Co., Providence, R. I.—Instantaneous "make and break" safety knife switches.

Joyce, Cridland Co., Dayton, O.—Samples of compound lever, screw and hydraulic jacks.

Kaufman-Conkell Co., Canton, O.—Cut-off and emergency device, which renders a broken trolley wire harmless. This requires an emergency wire placed a short distance above the trolley wire, connection with which can be made in case of breakage, thus carrying the car over the broken portion, avoiding delays in traffic.

Lombard Water Wheel Governor Co., Boston, Mass.—Water wheel and steam engine governors for maintaining constant output.

D. N. Long, La Salle, N. Y.—Models of the Niagara acetylene headlight for trolley cars and locomotives.

William T. C. Macallen Co., Boston, Mass.—Apparatus for span wire construction insulators and other line material.

Mitchell Tempered Copper Co., Corry, Pa.—Samples of pure copper castings for electrical purposes, including commutator bars and segments.

McMullen Woven Wire Fence Co., Chicago, Ill.—Full-size sections and models of the McMullen cable and spiral spring fences for railroads. The latter was described in our issue of Sept. 17.

The Paper Vending Machine Co., St. Louis, Mo.—Automatic machine whereby the passengers can secure a daily paper from a rack placed in the car and operated on the "nickel-in-the-slot" principle.

Pattinson, Andrews Co., Boston, Mass.—Switches of all kinds for cars and are lamps. (Other exhibits given last week.)

Rochester Hose Bridge Co., New York City.—Hose bridge placed on the tracks of the street-car line near convention hall, showing the method of avoiding delays in case of fire due to a hose line crossing the tracks.

L. A. Sayer & Co., Newark, N. J.—Full line of punches for conductors.

E. P. Sharp, Buffalo, N. Y.—Large assortment of second-hand uninjured material and railroad supplies.

The Simonds Mfg. Co., Pittsburgh, Pa.—Samples of malleable steel gears with hammered and split pinions.

D. J. Sinclair, Caledonia, N. Y.—Full size working model with attachments of Sinclair's automatic coupling, especially adapted for traction cars. This is a new coupler for regular pole and rigid coupling.

Standard Thermometer & Electric Co., Peabody, Mass.—The Upton Midget enclosed arc lamp for street railroad circuit.

Walker Company, Cleveland, O.—This company occupied a space next to the General Electric exhibit and showed the following apparatus: A double 4 A. equipment, including two 30 H. P. Walker motors on a Peckham truck with electric brake controller. This controller, designated as type J 2, is of the well known design, and in stopping the car the motors are converted into generators, the current developed being absorbed in a rheostat and the pole of the fields on the armature producing the necessary braking effect. The contacts are arranged so that the brakes can be applied gradually or quickly. The Walker 10 S. double equipment was also shown. Two No. 25 Walker motors of 200 H. P. each, on a McGuire's standard truck for elevated railroads. A 150 K. W. Walker generator for street railroads designed for a 500 volt winding and has eight poles. A two No. 30 H. P. motor designed for narrow gauge work was also shown. A 25 K. W. generator weighing 4,200 lb., with a possible output of 200 amperes at 125 volts and with a speed of 300 revolutions per minute was also exhibited. A switchboard for two 25 K. W. railroad generators with four feeder circuits, with necessary ammeters, switches, lightning arresters and rheostats; solenoid blow-out controller, having five running positions arranged for uniform gradations, all complete and designed so that a motor can easily be cut out if disabled (were included among the exhibits. In the controller the conducting core

renders it impossible for a ground to develop in the solenoid circuit. Six Walker 100 H. P. enclosed arc lamps for 110 volt circuit were also shown.

Wendell & McDuffie, New York City.—Samples of the Bowen face protector for motormen and gripmen.

Wheeler Reflector Co., Boston, Mass.—Oil and electric headlights with Wheeler reflectors for electric cars.

Westinghouse Electric & Mfg. Co., Pittsburgh, Pa.—This company made a large exhibit in which was shown some very excellent apparatus and machines, of which the following may be noted: Tank lightning arrester of 900 amperes capacity; 1,000, 600 and 450 ampere single pole circuit breakers; 600 ampere triple pole washer switch; 300 ampere triple pole, double throw, quick break-washer switch; 300 ampere double pole, quick break, washer switch with 500 volt fuse, also similar device for 600 amperes and with a single pole; 900 ampere single pole and a 600 ampere single pole, double throw, quick break washer switch; 300 ampere double pole washer switch of 500 volts; street car choke coil and street car canopy switch; line lightning arrester No. 5,795 and No. 1,835 and station lightning arrester style No. 1,836; 25-ampere double pole washer switch and street car lighting switch; alternating current constant potential arc lamps; B3, B4 and K14 controllers; No. 12A railroad motor of 25 H. P. and No. 49 railroad motor of 35 H. P., both with 500 volt circuit and No. 38B railroad motor of 50 H. P., also for a 500 volt circuit. A well-finished piece of workmanship was shown in the booster outfit consisting of a compound motor of 460 H. P. on the same bed plate with a series generator of 300 K.W. This is one of five which has been made for the Columbia & Maryland road. The exhibit also included a large number of photographs of some of the principal installations made by the company.

TECHNICAL.

Manufacturing and Business.

In our issue of Oct. 15 we noted the incorporation of the Schmick Patent Car Rail & Rail Joint Co., of Hamburg, Pa., for the purpose of making cars, rail joints and other railroad appliances patented by Henry J. Schmick, of Hamburg. The following officers have been elected: President, John M. Kutz, Mahanoy City; Vice-President, P. L. Diener, Hamburg; Secretary, Solomon K. Hoffman, Hamburg; Treasurer, Evan L. Shomo, Reading. The company is capitalized at \$1,000,000.

The Ironton Cross Tie Co., of Ironton, O., received orders last week for 40,000 cross ties for the Lehigh Valley, 35,000 for the Cincinnati, Hamilton & Dayton and 200,000 for the Lake Shore & Michigan Southern.

The Berlin Iron Bridge Co., of East Berlin, Conn., has received a contract to build an extension to the forge shop of the Collins Co., of Collinsville, Conn.

The Ensign Mfg. Co., of Huntington, W. Va., has received an order for two Russell snow plows for the Northern Pacific Railroad.

The Brownell Car Co., of St. Louis, Mo., which went into liquidation July 25, is to be reorganized shortly and it is expected that the plant will resume work Nov. 1.

The Consolidated Pneumatic Tool Co., with office at Room 1404 Bowling Green Building, H Broadway, New York City, has been incorporated under the laws of New York State with a capital stock of \$150,000, for the purpose of making and dealing in pneumatic tools and air compressors. It has bought the pneumatic tool plant of Wm. Wolstencroft's Sons & Co. at Frankford, Philadelphia, Pa., and also the patents of the Wolstencroft pneumatic tool which was illustrated and described in our issue of July 10, 1896; also all the patents of the Keller pneumatic tool heretofore made by the C. H. Haeseler Co., of Philadelphia. The Directors and officers are: John Evans, Peter Gray, O. W. Norcross, H. B. Torrey, Geo. Cohen, Geo. Hartford and W. P. Pressinger. President, Peter Gray; Vice-President, Geo. Hartford; Secretary, W. P. Pressinger; Treasurer, John Evans, and General Manager, Geo. Cohen. The tools will be made at the factory in Frankford.

The New England Construction Co., of East Everett, Mass., is making extensive improvements to its plant for the purpose of making columns and girders for steel buildings and to do all classes of bridge work. Walter B. Douglas has been appointed Chief Engineer and General Manager.

The Lidgerwood Mfg. Co. has perfected a new hoisting engine which is known as the Lidgerwood safety derrick engine, patented. A double drum engine, with two 6½ x 8 in. cylinders, is now on the floor of the Lidgerwood Mfg. Co.'s warerooms at 96 Liberty street, this city, where contractors and others are invited to call and examine it.

The Norfolk & Western has arranged with the Galena Oil Work, Ltd., of Franklin, Pa., for the lubrication of its entire equipment.

The Standard Railroad Signal Co., of Arlington, N. J., announces that H. S. Pfeil is no longer General Agent of the company.

On Oct. 14 contracts were awarded by the Commissioner of Public Works, Chicago, for a 30,000,000 gal. pumping engine for the Fourteenth street station and a 14,000,000 gal. engine for the Sixty-eighth street station. Both contracts were let to the Holly Company at a cost of \$138,074. These engines will be a part of the improved water service for Chicago, of which mention is made elsewhere in this issue.

The Electric Third Rail & Equipment Co., of St. Louis, Mo., has been organized with a capital stock of \$250,000. H. H. McIlhenny, Benjamin C. Seaton and Dempster Wishart are among the incorporators.

The Railway Street Car Indicator Co. has been formed at Edenton, N. C., by H. I. Donnan, W. G. Summerell and B. E. Byrd, to make and sell machines to indicate the stations along street and steam railroads. The capital stock is \$100,000.

The Putnam Machine Tool Co., of Portland, Pa., has been incorporated under the laws of Pennsylvania with a capital stock of \$50,000. The incorporators are: Jonathan Moore, M. Bethel; John I. Miller, Portland; Edwin Lewis, Philadelphia; Frank L. Howe, Stonington, Conn.; W. C. Edgett, South Bridge, Mass.

Iron and Steel.

The sale of the plant of the Wellman Iron & Steel Co. at Thurlow, Pa., Oct. 16, resulted in its being bought by Samuel A. Crozer, representing the second mortgage bondholders.

The Bingen blast furnace plant of the Bethlehem Iron Co. at Bingen, Pa., and the Neal furnace at Bloomsburg, Pa., have been sold and will be dismantled.

The Coronet Steel Co., of Catasauqua, Pa., which recently acquired the plant of the Catasauqua Mfg. Co., will enlarge and improve the plant to make steel castings, ingots, blooms, billets, bars, rods and plates.

The Carnegie Steel Co., Ltd., of Pittsburgh, Pa., is putting in at its Duquesne steel works a large Bessemer blowing engine made by the Edward P. Allis Co., of Milwaukee, Wis. It is of the horizontal, duplex, cross-compound, condensing type with two 76-in. air cylinders and 46-in. high and 88-in. low pressure steam cylinders with 60-in. stroke. The engine is capable of delivering 2,800 cu. ft. of air per minute, at a pressure of 30 lbs. to the square inch. The main shaft is 24 in. in diameter in main bearing and 26 in. in diameter at the wheel pit. The flywheel is 30 ft. in diameter and weighs 125,000 lbs. The machine is supplied with a Reynolds independent improved 36 x 16-in. air pump and jet condensers.

The Andrews-Hitchcock furnace at Hubbard, Pa., will be put in blast Nov. 1, after an idleness of about two years.

The furnaces and shops of John H. Bass, of Fort Wayne, Ind., in Chicago, St. Louis and Fort Wayne, have been consolidated into one corporation with a capital stock of \$3,000,000.

The Pottsville Iron & Steel Co., of Pottsville, Pa., is inviting subscriptions to \$100,000 of first mortgage six per cent. gold bonds (the total issue of which is \$350,000, secured by all the property and franchises now owned or hereafter to be acquired by the company), the proceeds to be used in enlarging and improving the works.

The new skelp department connected with the Oley street mill of the Reading Iron Co., at Reading, Pa., has been finished and will soon be running. It has been in course of building several years and is said to have cost more than \$100,000.

At a meeting of the new Standard Steel Co., held in Pittsburgh Oct. 23, the following officers were elected: President, Wm. McGinness; Secretary, James M. McNeil, and Treasurer, P. R. Borgan. Plans have been prepared for building a large plant. The capital stock of the company is \$500,000.

The plant of the Bellaire Steel Co. at Bellaire, O., started up Oct. 21 after an idleness of one week, caused by a strike. The terms of the employees were not met by the company, and their places have been filled by non-union workmen.

The J. Wood & Bros. Co., of Conshohocken, Pa., is adding a three-high 72-in. mill to its works. A new engine is also being built for the plant by R. S. Newbold & Son, of Norristown, Pa. It will have 32 x 54 in. cylinders and a fly-wheel 25 ft. in diameter.

The new rolling mill company which is the result of the strike at the Scottdale Iron & Steel Co.'s plant was organized at Scottdale, Pa., Oct. 25. The capital stock is \$125,000 and the Directors are: A. L. Keister, J. W. Ruth, A. C. Overholt, J. S. Parker, M. A. McCombs, of Scottdale; P. F. McCann and James Bennett, of Greensburg. A. B. Pickard, Cashier of the First National Bank of Scottdale, was elected Treasurer. The Directors expect to shortly begin work on a new plant.

New Stations and Shops.

The authorities of Hutchinson, Kan., have voted to issue \$35,000 in bonds to aid the Hutchinson & Southern Railroad to build a Union station, roundhouse and machine shops in Hutchinson.

In our issue of Oct. 15 we referred to the building of a new passenger station at Yoakum, Tex., by the San Antonio & Aransas Pass Railroad. The building will be two stories high, of cream-colored brick made at Calaveras, Tex., and trimmed with red brick. The ground floor will be occupied by two waiting rooms 30 x 30 ft. each; a dining-room 30 x 35 ft., and a baggage-room occupying a joint space of 30 x 30 ft. Between the waiting-room, on one side, and the dining-room there will be a passageway from the street to the tracks 12 ft. wide, and a similar passageway between the other waiting-room and the baggage and express room. The upper floor will be occupied by officers of the company. The work is being done under the supervision of Mr. Wm. Berry, Superintendent of Buildings.

The Fremont, Elkhorn & Missouri Valley Railroad is building a new passenger station at Lincoln, Neb. It will be 40 x 125 ft., with a baggage-room 25 x 80 ft., of Kasota stone and red pressed brick with terra cotta trimmings. A part of the building will be two stories high for use as offices. A large projecting shed 30 ft. wide will be built on the north side. The station will be heated by steam and lighted by electricity. The general contractors are Grace & Kelly, of Lincoln, who are required to finish the work by February, 1898. It will be used by both the Fremont, Elkhorn & Missouri Valley and Missouri Pacific roads.

The Chicago, Burlington & Quincy will build a small station at Louisiana, Mo.

Work has been begun on the superstructure of the new shops of the Missouri, Kansas & Texas, at Sedalia, Mo., for which the contract was awarded to J. A. Daly, of Nevada, Mo., as stated in our last issue. There will be 18 buildings in all, the principal buildings being as follows: Passenger paint shop, with stock room, 150 x 164 ft.; machine shop, 60 x 175 ft.; freight car shops, 110 x 244 ft., with 12 tracks and a capacity for 24 cars; blacksmith shop, 60 x 125 ft.; engine and boiler house, 50 x 100 ft.; wood mill, two stories, 80 x 150 ft.; passenger erecting and upholstering shop, five tracks, 100 x 146 ft.; store-room, two stories, the upper story to be used as offices, 40 x 80 ft.; oil house, 27 x 38 ft.; dry kiln, 25 x 40 ft.; transfer table pit, 80 x 735 ft., and several smaller structures. All the buildings are to be finished before June 1, 1898.

Purdue Laboratory.

The equipment of the Mechanical Laboratory, Purdue University, has been increased by the addition of a 100. H. P. tandem compound stationary engine, built by the Ridgway Dynamo & Engine Co.; the cylinders are 8½ in. and 14 in. in diameter by 12-in. stroke. Also a 2,000,000-gal. water-works pump, which has been in use by the city of La Fayette for a period of 25 years, has been installed both for exhibition purposes and for real use in the laboratory. A 50-K.W. generator, now building by the General Electric Co. for the electrical department, will have a specially wound armature, which will give either monocyclic or two-phase currents; the voltage will be 1,150.

New Steamer for the Florida East Coast.

A new steel steamer, the Miami, built for the Florida East Coast Railroad for service between Miami, Fla., and the Bahama Islands, was launched at the yards of the William Cramp & Sons Ship & Engine Building Co. in Philadelphia Oct. 23. It is 240 ft. long, 40 ft. molded beam, 22 ft. deep from top of upper deck to keel, with a main deck of 14 ft., a main draft of 9½ ft. and a displacement of 1,150 tons. The vessel will be schooner-rigged, with two funnels, and has a guaranteed speed of 16 knots an hour. The propelling machinery consists of two vertical inverted triple expansion engines, driving twin screws, steam to be supplied by four return tube boilers of the Scotch type. The indicated horse power will be about 1,600. There will be two decks and three tiers of staterooms to accommodate 120 passengers. The vessel is furnished with duplicate generating plants for lighting purposes.

The Brake Shoe Testing Apparatus.

We have spoken more than once recently of the possibility that the brake shoe testing apparatus now at Wilmerding might be installed in one of the technical school laboratories, say, for instance, at Purdue. We are informed that the matter is under consideration by the M. C. B. Committee and that the Westinghouse people are willing to surrender any rights that they have in case the apparatus is taken to a proper laboratory.

Creosoted Lumber for New Orleans Drainage System.

The New Orleans Wood Preserving Works, of New Orleans, La., have been awarded a contract to furnish creosoted lumber permeated with the greatest possible amount of creosote oil, for the new drainage system of New Orleans. It will be treated by the regular process of the company, which will necessitate building a number of additions to its plant.

The Webb & Thompson Train Staff at Kansas City.

The introduction of the Webb & Thompson train staff on the Chicago, Milwaukee & St. Paul, where it crosses the Missouri River, near Kansas City, was noticed briefly in the *Railroad Gazette* of Oct. 15. The length of line over which trains are operated by the staff at this point is about 1½ miles and this section is used by the trains of the Kansas City & Northern Connecting Railroad, a line built by the Kansas City, Pittsburgh & Gulf to connect with the Quincy, Omaha & Kansas City at Pattonsburg, Mo. At each end of the staff section the operator admits trains by a semaphore, and delivers the staff to the engineman by means of a crane similar to a mail crane. This crane, made by the National Switch & Signal Co., makers of the staff apparatus, is similar to that in use on the Chesapeake & Ohio, which has been described in the *Railroad Gazette*. In each case an engineman approaching the staff section encounters the signal before he comes to the staff crane, and if the signal indicates that he has the right to proceed he takes the staff without stopping.

Projectile Contract.

On Oct. 20 the Carpenter Steel Co., of Reading, Pa., received a contract to furnish the government with almost \$160,000 worth of armor-piercing projectiles, to be held in reserve for use of the navy. The contract calls for 2,000 13-in. armor projectiles, the half-ton kind used on the battleships, for which \$370 each is to be paid, the first lot of 100 to be delivered within 90 days, and the remainder within nine months, the period for the whole contract, however, to be reduced to five months if demanded by the United States, according to a special provision of the instrument. There are 667 six-inch projectiles, to cost \$38 each, of which 200 are required in 60 days and the remainder in six months, and there are respectively 2,000 and 1,400 4 and 5-in. projectiles at \$16 and \$20.50 each, of which 200 are to be finished in 75 days and the remainder in nine months. The projectiles are all to be of hardened steel, with soft metal caps.

Steel Pier for Atlantic City.

Plans are being drawn for a new steel ocean pier for

Atlantic City, N. J. James H. Windrim, of Philadelphia, was chosen as the architect and John A. Patterson, of the same city, engineer in charge.

Iron Pipe for Japan.

Prices are being asked on 7,000 tons of iron pipe for use in connection with the new water-works at Kobe, Japan. Prices are being asked of British and German as well as American pipe makers.

New Pumping Station for Asheville.

The Board of Aldermen of Asheville, N. C., will receive bids until Nov. 12 for building a new pumping station on the Swannanoa River and furnishing it with one horizontal triple expansion, direct acting, duplex condensing engine, capable of delivering 1,500,000 gals. of water in 24 hours against a total head of 198 lbs. per square inch, and one boiler of sufficient power to drive the pumping engine at its full capacity.

Ordnance Bureau and Government Armor Plant.

In his annual report Capt. Charles O'Neil, Chief of the Bureau of Ordnance, states that, in the opinion of the Bureau, the government can buy armor more cheaply than it could make it, and regards the making of armor "as a proper adjunct to a great commercial steel plant. Foreign practice confirms this view, and even should the department acquire a plant of its own the chances are that it would be at a great cost, and that it would lie idle a large part of the time, and thus suffer great deterioration, and that the expense and difficulty of operating it when needed would more than offset any advantages gained by such ownership. The armor manufactured during the past year is of uniform and excellent quality. The high standard of face-hardened armor, the manufacture of which originated in this country, has been maintained, and the bureau is confident that the armor made in this country is equal to and probably superior to any yet put afloat abroad."

Reservoir and Pumping Plant for Augusta.

Sealed proposals will be received by the Board of Water Commissioners of Augusta, Ga., until Nov. 9, for building the new water-works and furnishing material for same. The work will consist of a reservoir of 50,000,000 gals. capacity, filter plant of 6,000,000 gals. capacity, pumping machinery 12,000,000 gals. capacity, with turbine wheels, flumes, draft tubes, etc. There will be required approximately, 5,800 tons of cast-iron pipe and specials and 18,700 lin. ft. of 30-in. steel riveted pipe; pumping station, filter house, pipe laying foundations, etc.

Pig Iron Production in September.

The monthly review of the production of pig iron as published in the *Iron Age* shows that since the close of the year 1895 the productive capacity of the blast furnaces running has not been as heavy as it is now. On Oct. 1 there were 171 furnaces in blast, with a weekly capacity of 200,128 gross tons, against 161 furnaces in blast Sept. 1, with a capacity of 185,506 gross tons, and against 130 furnaces in blast Oct. 1, 1896, with a capacity of 112,782 gross tons. On Jan. 1, 1896, there were 241 furnaces in blast, but the weekly capacity was but 207,481 gross tons. We are now producing pig iron at the rate of over 10,000,000 tons a year, and since Oct. 1 several additional furnaces have been put in blast and others are preparing to run. Stocks, sold and unsold, Oct. 1, aggregate 691,527 tons, against 864,110 tons Sept. 1. These figures do not include the quantities of iron held by the large steel companies, which have been drawing quite heavily on their reserve for some time.

THE SCRAP HEAP.

Notes.

The New York, New Haven & Hartford has sprinkled seven miles of the road bed of the Air Line Division with crude petroleum, to lay the dust.

The engines of the through passenger trains of the Boston & Albany now run through without change over the whole length of the main line, 200 miles. The engineers and firemen, however, change at Springfield, midway, as heretofore.

The Massachusetts Railroad Commissioners have refused to sanction the use of a street railroad sprinkling car for watering streets in Boston. The Legislature recently passed a law permitting such watering, but the West End Street Railway Co. objects to it because it will delay its passenger cars, and the Railroad Commissioners say that the law is only permissive, and does not warrant the running of cars unless the street railroad company approves.

The establishment of a car ferry to Milwaukee by the Detroit, Grand Rapids & Western Railroad was announced last week. The company has purchased dock facilities at the mouth of Muskegon Lake, Muskegon, and on the Kinnikinnic River, Milwaukee, where it will build immediately the necessary docks. The boat, the Shenango No. 2, has a capacity of 26 cars. The railroad company has also made arrangements with the Crosby Transportation Co. for a package boat to run between Milwaukee and Muskegon. Heretofore this latter service has been via Grand Haven, but this winter the railroad will have a direct package boat, as well as the new ferry line between Muskegon and Milwaukee.

Railroad Material Duty Free to Costa Rica.

The government of Costa Rica has prolonged until until Oct. 31, 1898, the effects of the government decree of June 1, 1895, which exempted from duties all fixed and rolling materials for the tramways and light railroads built on the estates on the Atlantic slopes.

A Railroad in San Domingo.

On Aug. 16 a railroad 45 miles long, between Puerto Plata, on the north coast, and Santiago, in the interior of the Dominican Republic, was formally opened by the President of that country. The road crosses two mountain ranges and its building has been the work of years. Although a comparatively short line, it is, however, an important one in the Republic, as it not only passes through a country which comprises some of the richest coffee and cacao lands of the island, but also connects the fertile valley of Santiago with a seaport. The road was built with American and European capital and is operated by the San Domingo Improvement Co., an American corporation. There is only one other railroad for public use in San Domingo, the Samana & Santiago Railroad. This runs from Samana to La Vega, in the Valley of Santiago, a distance of 60 miles, and has been in operation since 1887. It was built and is owned and worked by Scotch capital.

Railway Routes into China.

Much contentious matter has been introduced into the discussion upon projected railways for "tapping" the over-vaunted resources of Yün Nan. Those who really wish to understand the question would do well, at the cost of a few pence, to read these lines by the light of the excellent maps published in Treaty Series, No. 7 (1897) and No. 19 (1894). The two British railway lines now under construction follow precisely the routes taken by the Chinese armies. The railway has already reached Lashio, whence it will continue to the Kunlon Ferry. We are following what is, with its branches, practically the only great trade route east of Mandalay to Muang Lem and Keng-hung, which are the termini or "tapping" places of whatever Chinese trade there is with Pu-erb Fu prefecture. The whole trade of the extreme west of Yün Nan must either pour into British territory or into Keng-hung, and it would have been unwise of the Indian Government to concern itself with debouches from Keng-hung until the fate of Keng-hung itself was settled. Keng-hung is now definitely Chinese, and part of its trade will go west to British territory, part south, to Kiang-sen and Zimmé.—*The Economist*.

For the Wheelman.

The Great Northern Railway Company have, in view of the increased volume of cyclist traffic, fixed a new kind of handgate at the principal level crossings on their railways, which enables wheelmen to pass over at their convenience. This arrangement entirely obviates the necessity of gatekeepers leaving their cabins to open the larger gates, through which cyclists previously had to pass, and which frequently occasioned long periods of waiting. To prevent an accident the gates are secured by lever from the cabins when trains are approaching.—*Railway News, London*.

To Build Railroads in Venezuela.

The State Department has received information that, in accordance with the new railroad law recently promulgated in Venezuela, the government of that country has announced that it will grant subsidies and other concessions, favorable to the development of its railroads. All material, machinery and equipment necessary for the railroads and the building are to be entered free of duty.

The government will contribute \$3,110 per mile for roads on level ground, \$6,210 per mile for roads on broken or swampy grounds, and \$9,320 per mile for roads in mountainous regions.

Dedication of Lake Geneva Observatory.

The new observatory presented to the University of Chicago by Mr. Charles T. Yerkes was formally turned over to the Trustees of the University by Mr. Yerkes on Oct. 21. The observatory is located at Williams Bay, on Lake Geneva, Wis., 76 miles northwest from Chicago, and the ceremonies of dedication and presentation to the University were attended by a large number of invited guests, including many prominent scientific men from different parts of the country. The observatory is well equipped and supplied with instruments, and contains the largest and most powerful refracting telescope ever made, the object glass measuring 40 in. and the dome containing it being 90 ft. high and fitted with a rising floor. The cost of the grounds, building and instruments was about \$360,000.

Electric Street Sprinkling in Boston.

The Massachusetts Railroad Commissioners lately gave a hearing on the petition of the city of Boston for approval of a plan to sprinkle the streets by use of electric car sprinklers on the tracks of the West End Street railroad. The American Car Sprinkler Co. was represented by counsel. Frank D. Perry testified that 75 or 80 ft. of surface could be sprinkled by the cars. Superintendent Stone, of the Worcester highways, Mayor Ramsdell, of Lynn, and others testified to the success of electric car sprinklers in those cities. President Little, of the West End road, and Superintendent J. E. Rugg, of the same company, opposed the petition on the ground that it would be against the interests of the public, and that the road could not make a contract for street sprinkling as it was a transportation company. Besides it would be necessary to make a stop every three-quarters of a mile to fill the sprinkler car, which means 18 stops in sprinkling the distance planned for, with a consequent delay to traffic. Mayor Quincy argued that the scope of the street sprinkling now done could be very largely increased at a slight expense by this method, though he admitted that it would probably delay traffic to permit sprinkling at all hours. He also admitted that it would be an innovation to sprinkle so large a city by this method. Chairman Sanford, of the Commission, pointed out that the act, passed this year, permitted the electric road to sprinkle the streets, but that it only permitted the board to approve, not prescribe, the terms of a contract which must be made between the city and company. Mayor Quincy hoped the moral influence of the decision would lead the company to make the contract. The mayor was requested to draw such an order as he felt covered the case, and the board intimated that it would then decide if it could consistently approve it.

The Transandine Railroad.

It is stated that the new Chilean ministry has announced itself in favor of the completion of the Chilean section of the Transandine Railroad, and that this measure is soon to be brought to the attention of the Chilean Congress.

The Proposed Power Plant at Richmond, Va.

At a meeting of the Committee on Streets, held Oct. 25, the ordinance was passed granting to the Virginia Electric Co. of Baltimore, the right to erect a plant at Richmond to utilize the James River for the generation and distribution of power. The ordinance provides that the company, within two years from the passage of the measure, shall have its plant sufficiently under way to supply for manufacturing purposes 2,000 H. P., and that at the end of five years the city shall have the power to

compel the company to put in conduits and place the wires under ground within a territory bounded by Broad, Cary, Ninth and Adams. Also that after six years its wires shall be put in conduits in other sections at the rate of two squares each year.

A New Railroad in Venezuela.

The new railroad recently built in Venezuela, between the seaport of La Vela and the inland town of Coro, will soon be inaugurated. The road has been built by the Coro & La Vela Railroad & Improvement Co. It is proposed now to extend the line to Maracaibo, and it is said that the work of building will begin soon, all materials for the work being already in the hands of the promoters.

Water-works in Panama.

Advance consular reports contain a letter from Consul-General Vifquain from Panama, dated July 20, 1897, in which he says that the department of Panama, on June 29, has signed a contract with Messrs. Emile Lebon and Belisaire Marenovich, of Brussels, Belgium, for building water-works in that city, the contractors to assume actual charge of the works within six months from that date. The capital stock of the company is to be \$1,000,000 (gold). The water is to be brought by pipes from the Juan Diaz River, 15 miles from Panama in the mountains. All plans and studies have been completed, and a great deal of actual work has been done in building roads, bridges, dams, etc. All this work was done under the direction of the government. The contractors have a period of two and a half years from June 29 to have the water-works finished and the city furnished throughout with water. The importance of this enterprise cannot be realized. Water used here now comes either from the roofs of houses or from bad wells, and is very unwholesome and causes much sickness. The sewerage of this city also dates back to the time of the Spaniards, and is little better than no sewerage at all, being stopped up at many places, hence resulting in bad odors throughout the streets. The laying of the pipes in the streets, involving opening the ancient sewers, together with the customary bad effects of excavating in this country, will probably cause an epidemic of yellow fever.

A Railroad Proposed in Nicaragua.

It is said that indications point to the building, and that soon, of a new railroad from the interior of Nicaragua to the Atlantic Coast. The proposed road will reduce the time of communication with the United States from 15 days to six days, and at the same time will prove beneficial to the cities of Rama and Bluefields.

Opening of Rivers in China.

On June 3, 1897, the West River, or Si Kiang, as it is called in Chinese, was opened to foreign trade as far as Wuchow-fu, a city of some 50,000 or 60,000 inhabitants, situated just within the eastern border of Kwangsi province, 200 miles west of Canton, and at the junction of the Kwei Kiang, or Cassia River, with the West River. This city has been declared an open port as well as one other, Sam-shui, about 40 miles west of Canton, where the West River is joined by the North River. Four other cities are made ports of call, two of them, Kongmoon and Komchuk, lying near the mouth of the river and commanding the trade of the islands situated there, which are among the most fertile and populous in all China. The water is shallow, and is said to be unsafe for vessels drawing more than 8 ft. The channel is as yet unsurveyed, and there are many rocks, but preparations are no doubt already made for placing the lights and buoys that will be needed. The opening of this important artery of trade has been under discussion for some years past, and is the result of persistent application by the British authorities.—*U. S. Consular Reports*.

The "Answer" Whistle Signal.

A reader, noting that Rule 342, Standard Code, reads, "Two short blasts of the whistle is an answer to any signal, except train parted," says:

"We have had two cases lately where this signal, in answer to conductor's signal to stop at next station, might have caused serious trouble, both being with fast passenger trains. The station signal was blown by the engineman, then the conductor signaled him to stop, there being passengers to get off, and the engineman responded by the two short blasts signal, as per Rule 342. In both cases the flagman of a freight train was out the required distance and understood the whistle of the passenger train engine to indicate that his flag was seen and acknowledged. But for the fact that the station stop signal was made in both cases before reaching the switch used by the freight trains (which had not then quite cleared, owing to their great length), the result might have been very serious, as the enginemen in both cases claim not to have seen the flagman's signal, although they ran over the torpedoes. These cases happened some months apart and at different places. What is your opinion as to the advisability of changing this rule so as to require a different response to conductor's signal to stop from two short blasts?"—*Train Dispatchers' Bulletin*.

Spanish American Notes.

A concession has been granted by Costa Rica to the firm of J. S. Casement & Co., of New York, for the construction of a railroad from the Costa Rican capital, San Jose, to the Pacific at a point near Punta Arenas, for \$2,898,971. This route was surveyed some years ago by the Costa Rica & Pacific Railway Co., of London.

The Buenos Ayres Great Southern Railroad, in Argentina, operating 1,469 miles of track, reports gross earnings of \$7,000,000 for the year ending June 30 last, against \$6,500,000 for the previous year. The extension of this line into the Territory of Neuquen, 350 miles in length, is rapidly nearing completion.

The railroad boom in Argentina, which did its share some years ago toward wrecking the finances of the republic, seems to be reviving, but in another form. In the eighties every projected line was in some way guaranteed by the government. Experience having shown that unguaranteed roads prospered more than those enjoying a subsidy (which entailed more or less government interference), the new crop of concessionaires ask only a charter, and three new companies have recently been incorporated, which propose building competing lines with those now operating under English management, the termini being respectively, 1st, Rafaela to Buenos Ayres; 2d, Buenos Ayres to Bahia Blanca; 3d, Cordoba to Bahia Blanca. It is also reported that a rate war is imminent between lines tapping the Northern Province of Tucuman.

The Price of Calcium Carbide.

A recent consular report states that the Aluminium-Industrie-Actien-Gesellschaft, at Neuhausen-on-Rhine, near the Falls of Schaffhausen, Switzerland, is the main source of calcium carbide for Germany and Eastern Europe. This company supplies about 132,000 lbs. of the carbide annually to the Prussian State railroads,

where it is used to purify and enrich oil gas. The report also says the only other competitor in the German field is the Electro-chemische Werke, at Bitterfeld, in Prussian Saxony, which company makes about 22,000 lbs. annually. This is not entirely true, however, even now, and several new enterprises are underway. The company at Neuhausen makes the carbide by the most economical method of smelting lime and carbon by electrical heat generated by water power. The prices at which this company offers its product for export, and which, so far as can be ascertained, are the minimum, are: For lots of 2 lbs. to 2,200 lbs., \$105.05 per ton of 2,000 lbs.; lots of 2,200 lbs. to 10,000 lbs., \$75.53 per ton; lots of 10,000 lbs. or over, \$78.78 per ton. These prices are for the carbide alone at Neuhausen. It is packed for shipment in tin cans or drums, and these, when sold for export, are again inclosed in wooden cases, and for this the following packing charges must be added to the net rates given above. The cans are of three sizes, containing, respectively, 26, 110 and 396 lbs., and are charged to the purchaser of carbide at \$0.15, \$0.58 or \$1.25 each, according to size. For the wooden cases in which the cans are packed the charge ranges from 10 cents per small can to 20 cents for the large ones, so that the whole cost for hermetically sealed tin drums and wooden casings would be not far from \$15.75 per ton of carbide.

In the case of the carbide made at Bitterfeld the electric heat is generated by steam power, and the cost is so increased that the product is sold at \$172.72 per ton.

Of the new enterprises an important one is a laboratory now building in Canton Glarus, Switzerland, where water power to the extent of 4,000 H. P. will be used. These works are intended to be ready for operation early next spring, and are expected to furnish a large and constant supply of carbide at \$55 to \$65 per ton. There is now a large new water-power being developed at Rhinefelden, near Basle, on the German side of the Rhine, and a new company is to manufacture calcium carbide there. Emil Rathenau is in charge of this works—a concern rival to the Aluminium Industrie Actien Gesellschaft at Neuhausen.

A new concern is to be started at Trollhattan, Sweden, and also calcium carbide is made by the British Aluminium Co., Ltd., at Foyer's Falls. In America there are several concerns making the material, one at Niagara and one in Canada, just above Niagara, and one in North Carolina; and there are several other concerns which have been making the material in more or less quantity.

LOCOMOTIVE BUILDING.

The Cooke Locomotive & Machine Co., of Paterson, N. J., has received an order to build five 10-wheel locomotives for the Oregon Railway & Navigation Co. They will have 20 x 26 in. cylinders and carry 200 lbs. of steam. The are intended for heavy freight work.

Five class T engines are being converted into the Richmond compound type at the Roanoke shops of the Norfolk & Western. The cylinders will be 22½ and 35 in. in diameter and 24 in. stroke. The special compounding parts are furnished by the Richmond Locomotive Works.

The Flint & Pere Marquette Railroad has placed an order with the Brooks Locomotive Works, of Dunkirk, N. Y., for two 10-wheel engines. They will have 18 x 24 in. cylinders, Belpaire boilers, Ewald iron staybolts, Coffin steel piston rods and crank pins, Damascus bronze bearings, U. S. metallic packing and Westinghouse-American brakes, and weigh about 115,000 lbs. in working order.

The Brooks Locomotive Works, of Dunkirk, N. Y., have received an order to build 12 mogul engines for the Kuishu Railway Co., Ltd., of Japan, of 3 ft. 6 in. gage. They will have 17 x 22 in. cylinders and weigh in working order 89,600 lbs., with 74,000 lbs. on the drivers; the fireboxes and staybolts will be of copper and the locomotives will be fitted to burn bituminous coal and equipped with hand and steam brakes.

The Chicago, Rock Island & Pacific is preparing to build 10 more 10-wheel class 25-A locomotives at its Chicago shops. Work will be begun in January next, and two engines a month will be turned out until the order is finished. These engines will be duplicates of the four built during the past summer, which were described in the *Railroad Gazette* of May 14, 1897. The boilers and tender tanks will be built by the Brooks Locomotive Works, the steel wheel centers by the American Steel Castings Co., of Thurlow, Pa., and the smaller steel castings by the Sargent Co., Chicago. Krupp tires and Janney rigid head automatic tender couplers will be used. Material for the boilers will be carbon steel and National Tube Works flues and Franklinton arch tubes will be used.

CAR BUILDING.

The Wells & French Co. is building 17 cars for the American Cotton Oil Co.

The Chicago & West Michigan has sent out specifications for 600 freight cars.

The Ann Arbor has placed an order with Pullman's Palace Car Co. for 400 box cars.

The Illinois Car & Equipment Co. is building 25 freight cars for the Chicago, Lake Shore & Eastern Railroad.

The Ensign Mfg. Co., of Huntington, W. Va., is building 50 side dump cars for the Columbus, Hocking Valley & Toledo.

The Youngstown Car Mfg. Co., of Youngstown, O., and the Erie Car Works of Erie, Pa., are each building 50 freight cars for the Georgia Railroad.

The Hammond Refrigerator Line (The G. H. Hammond Co., Hammond, Ind.) will buy 50 new refrigerator cars. Gould couplers and Westinghouse air-brakes are specified.

The Wagner Palace Car Co. has finished building 31 new Wagner cars for service between Boston and New York and Chicago. They consist of dining, buffet, library and regular and compartment sleeping cars.

The Lima Locomotive & Machine Co., of Lima, O., is converting 200 gondola cars of the Wheeling & Lake Erie into box cars. They will be equipped with Excelsior inside rods, Tower couplers and 10 of them will be furnished with Westinghouse air-brakes and Marden metal brake beams.

The Iowa Central has ordered 100 stock cars from the Terre Haute Car & Mfg. Co. These cars are to be equipped with Trojan couplers, New York air-brakes, interchangeable brake beams, board roofs, McCord

journal boxes, Fulton journal bearings, Scott springs and malleable castings throughout. The bodies and trucks will be the car company's standard.

The Chicago Great Western car contract was practically closed the end of last week, the Haskell & Barker Co. getting the order. It is understood that 150 box cars were ordered for immediate delivery and 150 more for December delivery. They are to be equipped with Barber trucks, Chicago roofs, Chicago couplers and American draft rigging.

The J. H. Somers Fuel Co., of Cleveland, are considering the purchase of new coal cars, but we are informed by an official of the company that they will probably not place any orders this year. The company already has 200 cars in service, of 60,000 lbs. capacity, but as they contemplate opening two more mines, these cars would not be enough to handle the increased traffic. The cars now in service were built by the Barney & Smith Co., and new ones would probably be of the same pattern, except the substitution of steel trucks for wood bolsters.

The Norfolk & Western has drawn up specifications for 500 new 60,000 capacity box cars, 200 of which will be built at once at the Roanoke shops and the remaining 300 let out. Fifty additional cars to fill vacant numbers will also probably be built in the near future. These cars will be equipped with M. C. B. couplers, air-brakes, Hutchins roofs and Wagner doors. They will be 36 ft. 1 in. long over all. Some interesting features in their construction will be the body bolsters, which will be of steel 6 in. "I" beams and ½-in. machine-riveted cover plates; the end posts of 4-in steel "I" beams fitting together with the end braces in cast-iron pockets top and bottom, and the bolsters, which will be of two 9-in. "I" beams fastened together with bolts and separators and an oak filling block 6 ft. 7 in. long. They will have iron axles and the trucks are to be equipped with N. & W. standard metal brake beams.

Among recent orders received by the Laclede Car Co., of St. Louis, Mo., are the following: Thirty trail and 20 small electric cars for the Consolidated Traction Co., and 20 cars for the Union Traction Co., of Pittsburgh; 12 cars, 28 ft. long, with compartment for the use of smokers, and eight closed cars for the Falls Road Electric Railroad, of Baltimore, Md., and five cars for the Pittsburgh & West End Electric road of Pittsburgh, Pa.

The John Stephenson Co., Ltd., of New York City, is building 125 cars for use on the Fourth & Madison avenue underground electric lines of the Metropolitan street railroad of New York. They will be 32 ft. long, 6 in. wider than the cable cars running on the Broadway line. They will be finished in the same general style as the Broadway cars, and will be lighted by electricity, and furnished with electric push buttons for the use of passengers wishing to stop the car when the notice of the conductor cannot be called otherwise. The bodies will be mounted on Peckham trucks and the cars equipped with Sterling fare registers and Sterling sand boxes.

BRIDGE BUILDING.

Belvidere, N. J.—The Town Council is considering an ordinance providing for a new iron bridge.

Beverly, Ia.—The Chicago & Northwestern has given the contract for a number of double track plate girder spans for use between here and Watkins to the Lassig Bridge & Iron Works, Chicago, Ill.

Chicago, Ill.—The time of receiving bids for the substructure of the eight-track railroad bridge to be built on Section O of the main drainage channel has been extended to Dec. 22.

It is said that the Commissioner of Public Works, L. E. McGann, has ordered plans made for a new bascule bridge across the river at Archer avenue. An appropriation of \$35,000 will be asked for the structure.

The Chicago & Northwestern has given the contract for a 190 ft. double-track draw span across the North Branch of the Chicago River to the Lassig Bridge & Iron Works.

Cleveland, O.—The contract for the superstructure of a bridge over West Side Boulevard has been given to the Mt. Vernon Bridge Co., Mt. Vernon, O., at \$7,700.

Clinton, Ia.—The contract for two 175-ft. and two 200-ft. spans to be built over the Mississippi River, at this place, has been let to the Detroit Bridge and Iron Works by the Chicago & Northwestern.

Columbia, S. C.—The Columbia Cotton Mills Co. has ordered plans for a bridge for foot passengers and wagons, to be built across the Congaree River, from here to New Brookland.

Higginsville, N. Y.—The contract for a new swing bridge over the canal has been given to the Wrought Iron Bridge Co., at \$3,215.

Hot Springs, Ark.—The Court has appropriated \$11,000 for a new bridge across the Ouachita River, near here.

Lancaster, Pa.—Bids for an iron bridge over Pequea Creek were opened by the County Commissioners as follows: A. B. Itoe & Co., \$2,990; Penn Bridge Co., \$2,050; Virginia Bridge Co., \$2,150 and \$2,100; Berlin Iron Bridge Co., \$2,090; Pittsburgh Bridge Co., \$2,090; Massillon Bridge Co., \$1,199 and \$1,895; Horseheads Bridge Co., \$2,168; John Denithorne & Son, \$2,119; Wrought Iron Bridge Co., \$2,300 and \$2,100; Groton Bridge Co., \$2,119 and \$2,129.

Marquette, Mich.—Among other improvements contemplated by the Duluth, Superior & Western, this winter, a number of small bridges will be replaced by new ones.

New Brunswick, N. J.—It is said that the Pennsylvania Railroad contemplates building a new four-track draw bridge over the Raritan River, at this place.

New Haven, Conn.—It is said that the Councilmen have concurred with the Aldermen in an order for \$35,000 bonds for the East Chapel street bridge.

Newton, Mass.—The Boston & Albany Railroad and the city of Newton are negotiating for the abolition of a number of grade crossings on the Circuit Branch of the road in the southern part of Newton.

New York.—The contract for the iron work as required by the new plans for running the electric cars across the New York & Brooklyn Bridge has been given to the Percord Bridge & Construction Co., at 2.25 cents per pound for material and 1.6 cents per pound for erecting. The work consists of removing some of the present columns in the New York approach and strengthening the present floor girders for the increased span.

Ottawa, Ont.—The Canadian Pacific Railway's plans for its entrance into Ottawa include a steel bridge across the Rideau River, between the present Canada Atlantic Railway bridge and Hurdman's bridge.

Pottsville, Pa.—The Philadelphia & Reading will prepare plans for rebuilding the broken portion of the Washington street bridge and also for strengthening the whole structure with lateral braces between the piers. Bids will be invited and submitted to the Council at its next meeting.

St. Francois, Que.—Tenders are being received by Joseph Denis, Secretary of the Municipality, for an iron and steel bridge with one span of 220 ft. and two spans of 200 ft. each, and for two abutments and two piers of masonry.

Thomaston, Conn.—The Selectmen of this place have been authorized to build an iron or wooden bridge near Newell.

Utica, N. Y.—The New York Central has made plans for a railroad subway to be built under University avenue. The cost of the work contemplated is about \$100,000.

Wilkes-Barre, Pa.—The contract for an iron bridge over Solomon's Creek at Franklin street has been given to the Eagle Iron Works for \$1,175.

Winnipeg, Man.—The plan of the City Engineer for a bridge over the Canadian Pacific Railway has been accepted and tenders for the superstructure will be invited.

Winona, Minn.—The Chicago & Northwestern has let the contract for a 350-ft. single track draw over the Mississippi River at this place, and also for an 84-ft. single track deck plate girder to the Detroit Bridge & Iron Works.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Mexican Southern, 1 per cent., payable Nov. 4.

Albany (N. Y.) Railway, quarterly, 1½ per cent., payable Nov. 1.

Columbus (O.) Street, quarterly, 1 per cent., payable Nov. 1.

Dry Dock, East Broadway & Battery (N. Y.), quarterly, ½ per cent., payable Nov. 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Baltimore & Ohio Southwestern, annual, for election of directors, Cincinnati, O., Nov. 18.

North End Street (N. Y.), annual, for election of directors, New York, Nov. 1.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds its formal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Locomotive Foreman's Club* meets every second Tuesday in the clubroom of the Correspondence School of Locomotive Engineers and Firemen, 385 Dearborn street, Chicago.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *St. Louis Railway Club* holds its regular meeting on the second Friday of each month, at 3 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. A. Sarge, Jr., 1533 Marquette Building, Chicago, is secretary.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736 1739 Monadnock Block, Chicago.

Locomotive Foreman's Club.

The next meeting of this club will be held in the rooms of the Correspondence School of Locomotive Engineers and Firemen, 335 Dearborn street, Chicago, Tuesday evening, Nov. 9. The subjects to be presented are "Diseases of the Air-Brake," by Frank D. Finn, and "Leakage of Steam Pipes," by R. T. Bancroft. The club, which will meet every two weeks at 335 Dearborn street, has changed the time of its meetings from Friday to Tuesday evenings.

General Passenger Agents.

The American Association of General Passenger and Ticket Agents held its 42d annual meeting at St. Louis, Oct. 19 and 20. A resolution was adopted in favor of laws prohibiting the sale of tickets except by authorized agents, and a copy was ordered sent to every Senator and Member of Congress and to every member of every State Legislature. The annual address was by Mr. Eustis, of the Burlington. W. A. Turk, of the Southern Railway, was elected President, and A. J. Smith (L. S. & M. S.) was re-elected Secretary.

Engineers' Society of Western Pennsylvania.

At a regular meeting of the Engineers' Society of Western Pennsylvania, held Tuesday evening, Oct. 19, 1897, a paper by C. A. P. Turner, C. E., entitled "Thermal Condition of Iron and Steel under Stress and Measurement of Stress by Means of Thermo-Electricity," was read before about 38 members of the Society. In this paper Mr. Turner showed that the strain in steel bars of large section could be measured easily and accurately by means of the thermopile and galvanometer, and that it was thus possible to ascertain whether or not any particular beam was fulfilling its proper function.

An animated discussion took place, during which a number of interesting points were brought out.

A report from the Committee on Roads was presented. It will be read and discussed at the November meeting.

Western Society of Engineers.

The Western Society of Engineers held a regular meeting at the Technical Club, 230 South Clark street, Chicago, on Wednesday, Oct. 20. Mr. T. T. Johnston, President, presiding. One hundred members and ladies were present. The report of the Entertainment Committee on the recent Eastern trip of the Society was read by the Chairman, Mr. Isham Randolph. Resolutions were adopted authorizing the President to appoint a committee to co-operate with the Directors and Librarian of the new Crerar Library regarding the selection of new engineering books, which the Crerar Library is now ready to buy and about which the library authorities have asked the Society to advise with them. The subject for the evening, "Gliding Experiments," by Mr. Octave Chanute, followed. Mr. Chanute has given much time to the study of air navigation, both in theory and by experiment, and his address was illustrated by many views of machines both in motion and at rest.

On Saturday afternoon, Oct. 23, about 100 members of the Society accepted the invitation of the Englewood & Chicago Electric Street Railway to visit its power-house and ride over the road. Special cars were run from the northern terminus of the line at Sixty-third street and South Park avenue, and members were given an opportunity to inspect the storage battery system by which this road is operated.

Central Railway Club.

The next regular meeting of this Club will be held at the Tower Hotel, Niagara Falls, N. Y., on Friday, Nov. 12. A report on "Springs for Freight Car Trucks," by a committee consisting of Messrs. H. C. McCarty, H. F. Ball, J. R. Petrie, will be presented, and a discussion on "Journal Bearing Keys; Their Proper Relation to the Journal Bearing and Box," committee, H. F. Ball, will be held. Also a discussion on a topical question by S. Higgins, "How are we to use the measurement 4 ft. 6%, as noted on page 10 of the M. C. B. Code that went into effect Sept. 1, when mounting second hand wheels where it is only necessary to remove one wheel, the wheel left on the axle having worn flange, but not worn bad enough to condemn it?"

Upon the recommendation of the Executive Committee, the Club, at its September meeting, decided to arrange some form of entertainment in connection with the business sessions. A committee was appointed, consisting of James Macbeth, Chairman, J. R. Petrie and the Secretary, and they have arranged for an excursion to Niagara Falls, a visit to the power plant at that place and a trip over the Gorge road for the November meeting. Special cars will be provided for the ride over the electric line between Buffalo and the Falls. They will leave the corner of Niagara and Main streets at nine o'clock on the morning of Nov. 12. In order that a sufficient number of cars may be secured, all who intend to make this trip must notify the Secretary to that effect not later than Monday, Nov. 8. It is also necessary that each member intending to be present at the meeting should so advise the Secretary, in order that ample provision may be made in the way of lunch at the hotel.

Western Railway Club.

The Western Railway Club held a regular monthly meeting on Oct. 19 in the Auditorium Hotel, Chicago. Before proceeding with the reading of papers, President Delano said that it had been decided to provide a question box in which members may place memoranda of any subjects, suitable either for consideration in a paper or for short discussion, members to subscribe their names to questions suggested, or not, as they may choose. It is the intention to make the short discussion of topical questions a feature of the club year and each member is urged to help in making the list of questions as attractive, and the discussion of the questions as spirited and interesting, as possible.

A paper on "Washing Out Locomotive Boilers," by Mr. John Mackenzie, was read by title and brought out a long discussion. Mr. Mackenzie advocated, both in his paper and in his discussion of it, a liberal use of the surface blow-off cock between division points and blowing off at division points, but he took the position that too frequent washing out may result in more annoyance from leaking tubes than when boilers are washed out less frequently. Several other members took the same position. It seemed to be the general opinion that it is

possible to wash out too frequently, but that the blow-off cocks should be used with sufficient regularity to prevent foaming in the boiler. It was generally agreed that it was best to purify the water before it reaches the boiler, but this requires a secondary settling tank and no one was prepared to give figures on the cost of such a system.

There were several eminent physicians and chemists present to discuss the question, "Disinfecting Passenger Cars," and therefore the paper by Mr. Wm. Garstang, on "Heating Passenger Cars," and the topical question, "The Advantages of Cupping or of Corrugating Fire Box Sheets," were put over to the November meeting. The discussion of the question of disinfection brought out much information concerning the comparatively new disinfectant formaldehyde.

RAILROAD LAW—RECENT DECISIONS.

In Texas an ordinance forbidding trains to be run faster than six miles an hour, within the city limits, is held to be operative in the yards of a railroad company as well as elsewhere in the city (decided in the Ct. of App., May, 1897).¹

In the same state where a railroad company secures a grant of a right of way, in consideration of an agreement on its part to pay for all stock of the grantor killed by it in any way, without litigation, it does not forfeit the grant by failure to comply with such contract, unless there is a condition expressly stated therein that the right of way shall revert to the grantor in the event of such non-compliance. The remedy of its grantor is in an action for damages (decided in the Ct. of App., June, 1897).²

In a proceeding brought in California to compel the forfeiture of the franchise of a street railroad company and to impose upon it a fine provided by statute in certain cases, it appeared that the company had never in good faith operated its road for the convenience of passengers, but had merely pretended to do so, running only one car over its tracks each day for the sole purpose of holding the franchise. The evidence tended to show that this was done in order to prevent the issuing of a franchise to others. The franchise is declared forfeited and the maximum fine allowed by the statute, \$5,000, imposed (decided in Sup. Ct., July, 1897).³

In Kansas, in order to hold a railroad company liable for damage caused by fire, alleged to have been started by one of its engines, it is not indispensable to prove by direct evidence that the fire was set by an engine of the company. Where conflicting evidence is offered to account for the origin of the fire a verdict against the company will not be disturbed on appeal (decided in the Sup. Ct., July 1897).⁴

In an action decided in Kansas, it appeared that a railroad company had been accustomed to stop its trains at intervals for considerable lengths of time so as to obstruct travel at a city crossing. At such times people were in the habit of climbing over, crawling under, or going around the trains. It is held not to be such negligence as would necessarily bar a recovery for the injury sustained, where a boy attempted to pass around the rear end of a train so obstructing the crossing, and was struck by the train, which had just begun to move backward. Whether or not this was such negligence was for the jury to conclude from the evidence offered (decided in the Sup. Ct., July, 1897).⁵

In Alabama, where the owner of land encumbered by a mortgage conveys a right of way over it to a railroad company, which takes possession and constructs its road under the conveyance, all the mortgagee can claim from the company is compensation for the land appropriated. He is not entitled to sell the land with the improvements thereon in satisfaction of his mortgage. Equity in such a case will make an exception to the general rule of law that where fixed improvements are placed upon real property they become part of such property and are subject to an existing mortgage thereon (decided in the Sup. Ct., July, 1897).⁶

The federal court holds that when a shipper of freight over a railroad has signed a paper containing stipulations limiting the carrier's liability which are not plainly included within the terms of the contract it is for the jury, in an action to recover for the loss of the freight, to determine whether the shipper understood, or ought, under all the circumstances, to have understood, that there was such a limitation of liability (decided in the Circ. Ct., N. Y., June, 1897).⁷

The same court holds that the right of an employee of a railroad company, which operates its road partly in Texas and partly in Mexico, who is injured in Mexico by the negligence of the company, to recover in a civil action damages for such injury under the law of that republic, may be enforced in a federal court of the state of Texas, where both parties are citizens of the United States, unless the dissimilarity between the Mexican law and the law of Texas is so great as to conflict with the settled public policy of Texas (decided in the C. C. A., 5th Circ., April 7, 1897).⁸

In the same court it is held that where a bill of lading exempts a carrier from liability for "loss or damage arising from collisions, explosions or accidents to boilers or machinery" the word "machinery" applies only to the group of mechanical parts connected with the boiler and steam supply, and it does not include an axle of one of the cars in a train. Accordingly, under such a contract a carrier is not exempted from liability for damage caused by the breaking of an axle of a car (decided in the C. C. A., 6th Circ., May, 1897).⁹

In an action decided in New Jersey there was testimony that the conductor of a trolley car, who had undertaken to let off the plaintiff, who was a stranger, at a given destination, had carried him past it. He then let the plaintiff off on the company's right of way and directed him to walk back on the track. While doing so, in the night, the plaintiff followed the track to a trestle, where he was struck by a car coming from the opposite direction. It is held that in giving this instruction the conductor was acting as the agent of the company; that whether he gave it, and whether it was act of negligence, were questions for the jury to determine, as was also the question of the contributory negligence of the plaintiff in going on the trestle, if so directed. It is also held that if the plaintiff was warned by the conductor not to go on the trestle he could not recover; also that the motorman whose car struck the plaintiff was under no duty to be on the lookout for pedestrians on the trestle (decided in the Ct. of App., June, 1897).¹⁰

In Michigan, where a street railroad franchise provides that, on the company's failure to pay the cost of paying between its tracks, the city may revoke the franchise, a forfeiture will not be forbidden because, from insufficiency of earnings, the company has become insolvent and unable to pay such cost. It is not necessary that there should first be a judicial determination that the breach warrants a forfeiture (decided in the Sup. Ct., July, 1897).¹¹

The Virginia statute requiring railroad companies to fence their tracks, except where an adjoining landowner has been compensated for maintaining his own fences,

and which provides that in cases of injury to "property" on any part of the track not so fenced the claimant need not show negligence, is not intended to protect railroad employees, and, though the death of an employee results from a failure to comply therewith, his representatives cannot recover without proof of negligence (decided in Circ. Ct., July, 1897).¹²

- ¹ Houston, E. & W. T. vs. Powell, 41 S. W., 695.
- ² Beaumont Pasture Co. vs. Sabine & E. T., 41 S. W., 513.
- ³ People vs. Sutter St. Ry., 49 Pac., 736.
- ⁴ A. T. & S. F. vs. Mathews, 49 Pac., 602.
- ⁵ A. T. & S. F. vs. Cross, 49 Pac., 599.
- ⁶ First Nat. Bank of Gadsden vs. Thompson, 22 S., 603.
- ⁷ Sayles vs. N. Y., N. H. & H., 81 Fed., 326.
- ⁸ Evey vs. Mexican Cnty., 81 Fed., 291.
- ⁹ Fairbank & Co. vs. C. N. O. & T. P., 81 Fed., 289.
- ¹⁰ Young vs. Camden, G. & W., 37 Atl., 1013.
- ¹¹ Union St. Ry., vs. Saov, 71 N. W., 1073.
- ¹² Newsom's Adm'r vs. N. & W., 81 Fed., 133.

PERSONAL.

—Mr. J. M. Percy, Division Master Mechanic on the Cincinnati, Hamilton & Dayton, with headquarters at Cincinnati, O., has resigned.

—Mr. Samuel Evans, Supervisor of the Philadelphia & Reading at Pine Grove, Pa., died at his home at that place Oct. 21, after a brief illness.

—Mr. P. Bruner, Superintendent of the Cleveland, Lorain & Wheeling, with office at Uhrichsville, O., has resigned. Mr. Bruner had held his late office since August, 1892, and previous to that he was Trainmaster of the Pittsburgh Division of the Baltimore & Ohio.

—Mr. John C. Noyes died at his home in Bayonne, N. J., Oct. 17. Mr. Noyes was Agent for the Indianapolis & St. Louis for four years, up to April, 1870, when he was made General Freight Agent of that road. In February, 1883, he was appointed General Manager of the Merchants' Dispatch Transportation Co., and held that position until the latter part of 1894, when failing health compelled him to retire from active work.

—Mr. John E. Martin died at Evansville, Ind., Oct. 12. Mr. Martin had been in railroad service since October, 1851, when he was made Assistant Secretary of the Evansville & Illinois, now the Evansville & Terre Haute. He afterward became Secretary and Treasurer of the same road and in October, 1873, was elected President, holding that office until July, 1881. Mr. Martin was elected Vice-President and General Manager of the Ohio Central in May, 1892, and was made Receiver for that road in September of the following year.

—Mr. George S. Hobbs, heretofore Auditor of the Southern Railway, with office at Washington, D. C., has been elected General Auditor of the Maine Central. Mr. Hobbs was born at Wells, York County, Me., in 1859, and entered railroad service in 1878 as Clerk in the general office of the Eastern Railroad of Massachusetts. Since that time he has been connected with the Marquette, Houghton & Ontonagon, the Duluth, South Shore & Atlantic and the Tennessee, Virginia & Georgia. In 1890 he was appointed Superintendent of Car Service of the Boston & Maine, holding that office until 1894, when he became Auditor of the Southern.

—Mr. J. T. McBride, General Manager of the Duluth, Missabe & Northern, has resigned. Mr. McBride has been connected with the Duluth Missabe & Northern since April 1, 1895, when he was elected First Vice-President and General Manager. He resigned the first named office, however, last June, being succeeded by Mr. W. J. Olcott. Mr. McBride was born in Ireland June 10, 1852, and entered railroad service in May, 1870. He was appointed Superintendent of the Chicago & Great Western and the Chicago & Northern Pacific in November, 1889, and held that office until December, 1891, when he became Local Freight Agent of the Illinois Central at Chicago, Ill. In August, 1893, he was appointed General Manager of the Everett & Monte Cristo, and held that office until he came to the Duluth, Missabe & Northern.

—Mr. Thomas Doane, well known as a railroad engineer, died on Friday, Oct. 22, 1897. He was born Sept. 20, 1821, in Orleans, Mass., where his father was a citizen of considerable prominence. His school education ended when he was about 21 years of age; he then entered the office of Samuel M. Felton, a noted Civil Engineer of that time. Under him Mr. Doane was in charge of a division of the Vermont Central Railroad, and later was for two years Resident Engineer of the Cheshire Railroad. In December, 1849, he opened an office in Charleston, Mass., where he carried on his profession of civil engineering and surveying until his death.

In 1863 Mr. Doane became Chief Engineer of the Hoosac Tunnel, which was relocated under his direction, and upon the lines adopted by him it was finally built. Of his work here, Drinker (tunneling) says: "Mr. Doane's connection with the Hoosac Tunnel in the early days of that great work is not a matter of especial, but of universal interest to the engineering profession of America, for to his persistent energy, his far-seeing sagacity and his able management we in a large measure, and in fact chiefly, owe the development and introduction into this country of the present advanced system of tunneling with machinery and high explosives; it was under his direction, as Engineer of the Commission, that the state experiments were made and the long and disheartening fight carried through, which terminated in favor of the new system, the system which has given us the Burleigh, Ingersoll and Wood drills, and which also showed Americans practically what the potent agency of nitro-glycerine, first applied by Nobel in Europe, really was."

In connection with this work, to secure power to operate his air compressors, he constructed the dam across the Deerfield River, an important work at that time. He resigned his position in 1867, but was afterward employed as an expert in connection with the tunnel, and about the same time was also Consulting Engineer of the Troy & Greenfield Railroad. In 1875, on the completion of the tunnel, Mr. Doane ran the first engine through it. From 1869 to 1873 he was Chief Engineer of the Burlington & Missouri River, in Nebraska, a road built in accordance with Mr. Doane's well-known ideas, with low grades, auxiliary power being used at the few points where high grades were necessary. He was successful in securing a line economical to operate. In 1870 he was appointed Consulting Engineer of the Northern Pacific Railroad, where he served one year, giving especial attention to matters of location.

For a number of years Mr. Doane had been often consulted by most, if not all, of the railroads centering in Boston, to give expert advice or testimony, and his services were sought in a similar way by the Railroad Commission, perhaps the most important work done for them being his report upon the proposed Northern Union Station.

He was until his death an active member of the Boston

Society of Civil Engineers, of which he was elected President shortly after the reorganization in 1874, and was nine times re-elected to serve in that capacity. His interest in the Society was maintained to the last. He became a member of the American Society of Civil Engineers in 1882.

During his residence in Nebraska he was instrumental in founding a college, which bears his name, and of which he continued a Trustee. His interest in it was substantial and earnest, and for many years past he had made an annual trip to Nebraska to visit Doane College.

He was a member of a number of religious, charitable, educational and other societies, and was widely esteemed.

ELECTIONS AND APPOINTMENTS.

Albany & Vermont.—At the annual meeting of stockholders, held Oct. 19, the following Directors were elected for the ensuing year: Geo. H. Cramer, Geo. B. Warren, John B. Gale, Chas. W. Tillinghast, C. E. D. Tibbitts, John I. Thompson, Le Grand B. Cannon, Edw. C. Gale, James A. Eddy, John H. Neher, Wm. Howard Doughty and Geo. T. Lane.

Ann Arbor.—At a meeting of stockholders held Oct. 22, Daniel C. Tate was elected a Director to succeed E. W. Tolerton, of Toledo, resigned.

Atchison, Topeka & Santa Fe.—B. J. Libbe, heretofore Traveling Freight Agent of the Iowa Central at Peoria, Ill., has been appointed Chief Clerk of the general freight department of this company.

Baltimore & Cumberland Valley.—At the annual meeting of stockholders, held at Hillen Station, Baltimore, Md., Oct. 20, the following Directors were elected: John M. Hood, Lloyd L. Jackson, B. A. Betts, Chas. W. Humrichouse, Abraham O. Frick, Henry A. McComas and Geo. R. Gehr.

Baltimore & Ohio.—A. J. Frazer, heretofore Division Superintendent of the Southern at Birmingham, Ala., has been appointed Superintendent of the Pittsburgh Division of this road, with headquarters at Pittsburgh, Pa., to succeed M. B. Cutter, who resigned Sept. 1. The appointment will take effect Nov. 1. The commercial freight agencies at Kansas City, Mo., and at Quincy, Ill., held respectively by A. J. Davies and H. A. Laing, have been abolished, effective Nov. 1.

Baltimore & Ohio Southwestern.—F. B. Johnson has been appointed Traveling Passenger and Freight Agent of the Springfield Division with headquarters at Springfield, Ill. The appointment will take effect Nov. 1.

Black Diamond.—L. C. Carter, of Knoxville, Tenn., has been appointed Superintendent of Location for all bridges and viaducts along this system.

Cincinnati, New Orleans & Texas Pacific.—Charles Patton, heretofore Cashier and Paymaster, with headquarters at Cincinnati, O., has been elected Treasurer, with office at Cincinnati, O.

Cleveland, Lorain & Wheeling.—W. H. Romoser, heretofore Trainmaster, with headquarters at Uhrichsville, O., has been appointed Superintendent, with office at the same place, to succeed P. Bruner, resigned.

Cleveland Terminal & Valley.—At the annual meeting of stockholders held at Cleveland, O., Oct. 19, Messrs. J. M. Duane and Calvary Moore were elected Directors to succeed Messrs. Alexander Shaw and Wm. H. Blackford.

Cleveland, Wooster & Muskingum.—At the annual meeting of stockholders held at Cleveland, Oct. 19, the following Directors were elected for the ensuing year: Thomas M. King, J. T. Johnson, F. H. Goff, E. C. Lemars, Daniel E. Durr and J. B. Taylor. Thomas M. King was elected President to succeed C. J. Ryan.

Colorado Midland.—At a meeting of stockholders, held at New York Oct. 26, the following Directors were elected: Frederick P. Olcott, B. A. Sands, James N. Jarvie, Charles F. Ayer, George Sherman, R. Francis Hyde, James N. Wallace, George Bertine, George W. Ristine, Henry T. Rogers and Lewis B. Johnson. George W. Ristine, heretofore Receiver and General Manager, was elected President.

Denver & Rio Grande.—Philip Doddridge has been appointed General Agent, with headquarters at St. Louis, to succeed W. J. Jeffrey, deceased.

Duluth, Missabe & Northern.—J. T. McBride, General Manager, with office at Duluth, Minn., having resigned, that office has been discontinued, and hereafter all matters pertaining to that department should be referred to W. J. Olcott, First Vice-President, Duluth.

Evansville & Richmond.—At a meeting of stockholders, held at Washington, Ind., Oct. 20, the following directors, all of Chicago, were elected: John R. Walsh, Lyman A. Walter, A. S. Lansier, A. F. Patch and F. M. Trissall. At a subsequent meeting of the Directors John R. Walsh was elected President and Lyman A. Walter Secretary.

Fort Wayne, Terre Haute & Southwestern.—At a meeting of stockholders, held at Indianapolis, Ind., Oct. 25, the following directors were elected: Charles M. Bradley, Rock Island, Ill.; J. G. Skinner, Moline, Ill.; F. A. Gregory, John J. Appel, William H. Daggett, Oliver W. Isensee and W. P. Kappes, all of Indianapolis.

International & Great Northern.—George L. Filer, who was recently appointed Commercial Agent, with headquarters at San Antonio, Tex., has been transferred to Dallas, Tex., to succeed John T. Hendricks, resigned.

Lehigh Valley.—Thomas A. Cole, heretofore Chief Clerk in the passenger department, has been appointed Acting Car Accountant, with headquarters at Bethlehem, Pa., to succeed C. H. Webb, Car Accountant, resigned.

Maine Central.—At the annual meeting of stockholders held at Portland, Me., Oct. 20, Wm. P. Frye and Richard Olney were elected Directors to succeed Payson Tucker, resigned, and Geo. M. Pullman, deceased. George S. Hobbs has been elected General Auditor to succeed Wm. M. Colby; he will have general charge of the auditing department under the direction of the President and the Board of Directors or Executive Committee. T. L. Dunn has been appointed Chief Engineer with office at Portland, Me.; he will have charge of all matters relating to maintenance of way, bridges and buildings. A. S. Bosworth has been appointed Purchasing Agent with office at Portland, Me. The office of Supply Agent has been abolished. The above appointments took effect Oct. 21.

Mexican Central.—G. A. Muller, heretofore Commercial Agent at the City of Mexico, has been transferred to El Paso, Tex., to succeed R. E. Comfort, resigned. A. F. Andrade has been appointed Commercial Agent at the City of Mexico, to succeed Mr. Muller.

Nashville & Decatur.—At the annual meeting of stockholders held at Nashville, Tenn., Oct. 20, the following Directors were elected: D. B. Cliffe, W. A. Goodwin, T. S. Weaver, Byrd Douglas, A. W. Harris, W. W. Berry, J. H. Thompson, John Orr, John Overton, W. E. Winstead, W. R. Pryor, J. E. Washington, G. A. Washington, H. A. Tyler and M. H. Smith.

Northern Pacific.—At the annual meeting of stockholders, held Oct. 21, the following new directors were elected for the ensuing year: Daniel S. Lamont, Charles S. Mellen and John G. Moore.

Oregon Short Line.—George Hickey, heretofore Chief Clerk to the General Superintendent, has been appointed Car Accountant, with headquarters at Salt Lake City, Utah, to succeed W. D. Lincoln, resigned. Mr. Hickey will be succeeded as Chief Clerk to the General Superintendent by H. C. Jenkinson.

Portland & Rochester.—At the recent annual meeting of stockholders held at Portland, Me., the following Directors were elected for the ensuing year: Franklin A. Wilson, Lucius Tuttle, Richard Olney, Samuel C. Lawrence, William G. Davis, Joseph S. Ricker, Lewis C. Ledyard, Henry M. Whitney, Henry R. Reed, Thomas W. Hyde, John Ware, Joseph H. Manley and William P. Frye.

Rio Grande, Sierra Madre & Pacific.—J. T. Logan, formerly Manager of the Pacific Express Co., at El Paso, Tex., has been appointed General Traffic Manager of this road, with headquarters at Juarez, Mex.

Western Maryland.—At the annual meeting of stockholders held at Hillen Station, Baltimore, Md., Oct. 20, Wm. Updegraff was elected a Director to succeed Wm. Kealhofer, of Washington County, resigned.

Wheeling & Lake Erie.—W. J. Sherman, Chief Engineer, with headquarters at Toledo, O., having resigned, that office has been abolished. The duties of the office will be assumed by the General Manager. Frank E. Bissell and A. S. Bretherton have been appointed Assistant Engineers, reporting to the General Manager. T. P. Bodell has been appointed Superintendent of Bridges, Buildings and Water Stations, reporting to the Superintendent.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Arkansas Southern.—It is reported that surveys are being made for an extension of this road from Junction on the southern boundary of Arkansas southeast through Louisiana to Monroe, about 90 miles. The road now runs from El Dorado, Ark., south 27.3 miles to Junction City. It was chartered in 1892 to build from El Dorado to Alexander, La., 125 miles. The present road was completed in 1894. C. C. Henderson, El Dorado, Ark., is General Manager.

Atlanta & Alabama.—It is reported that work has been begun on this road to run from Atlanta, Ga., southwest through Georgia and Alabama to Selma, in Douglas County, Ala., 180 miles (see this column for July 16). The work was begun at Selma on Oct. 21 with 50 mules and 100 men. The Erie Construction Co., of New York, is said to have the contract for building the road. R. M. Mitchell, of Augusta, Ga., is President.

Black Diamond.—L. C. Carter, of Knoxville, Tenn., the recently appointed Superintendent of Location for bridges and viaducts, starts on November 1 to plan and locate the bridge across the Ohio River at Dover, Mason County, Ky. Later he will locate the Ohio River bridge at Vevay, Ind., a bridge across the Clinch River in Tennessee and two across the Tennessee River near Knoxville. This system is the one proposed by A. E. Boone, of Zanesville, a number of whose projects have been given from time to time in these columns.

Brockville & St. Lawrence Bridge Co.—This company was incorporated in New York Oct. 23, with a capital of \$2,500,000, being the consolidation of the Brockville and New York Bridge Co., which has the right to build and maintain a bridge between Brockville, Can., and Morristown, N. Y., and the St. Lawrence Railway Co., which has been formed to build a road from Morristown to connect with the Utica & Black River branch of the Rome, Watertown & Ogdensburg division of the New York Central & Hudson River. The officers of the new company are: President, Charles J. Pusey, Brockville; Vice-President, Clark R. Griggs, New York; Secretary, R. T. Colburn, New York; Treasurer, Lucien B. Howland, Brockville.

Bartington & Missouri River.—Surveys have been completed for a branch from Cambria, Weston County, Wyo., northeast to Dumont, on this company's line, 18 miles south of Deadwood, S. Dak. This will greatly facilitate the transportation of coal and coke from Cambria to the smelters at Deadwood. The haul will be reduced from 160 miles over four per cent. grades to 50 miles over two per cent. grades. This line will run through a good timber region, which will also be of value to the Black Hills mining industries.

Canada Atlantic.—The extension of this line south from Lacolle, Que., to Alburg Springs, Vt., a point on the Central Vermont, is practically completed. From Alburg Springs to Swanton, seven miles, the company has a trackage contract with the Central Vermont. At Swanton the company is putting in an extensive terminal for the Central Vermont and the Boston & Maine, which it is expected will be finished not later than Nov. 15 together with the new line. This extension from Lacolle with bonds at \$25,000 per mile was authorized by the Canadian government last winter. The road crosses the Richelieu River by bridge at Lacolle. The new road and the traffic agreement will give the company a line from Swanton to Parry Sound, Que., where it is stated that connection will be made by steamers for Chicago. (See these columns for Oct. 8.) E. J. Chamberlin, Ottawa, Ont., is General Manager.

Central of Pennsylvania.—It is reported that engineers are surveying for an extension from Lehigh Gap, Pa., northeast about 12 miles through Millport to Kunkleton, Monroe County. The road is for the benefit of the New York-Pennsylvania Mining & Mfg. Co., which has recently purchased beds of clay in the vicinity of Kunkleton to manufacture tiling, brick and similar articles.

Chicago & Northwestern.—This company has let a contract to D. D. Streeter & Co., of Chicago, for some second track work from Barrington to Harvard, Ill., 31.1 miles, and from Evansville to Madison, Wis., 22.5 miles. The line is single track at present. Some of the work will be done this fall, and the balance will be turned next season.

Chicago Terminal Transfer.—The second track on

the old Chicago & Calumet Terminal from Blue Island, Ill., northwest via Chicago Ridge & Chappell, to Mc Cook, 13.88 miles, has been completed. The work was done by the Chicago & Calumet Terminal (see this column for May 21), which was subsequently leased to this company. The maximum grade is 20 ft. per mile; the maximum curvature 6 deg. There are four wooden trestle bridges, a total length of 381 ft., two steel bridges with a total length of 325 ft., and five railroad crossings. The building has been paid for out of the earnings of the property. Work was begun May 1 and the track was completed and in operation July 1.

Cincinnati, Georgetown & Portsmouth.—The citizens of West Union, O., have guaranteed \$10,000 to this company to aid in building an extension from Georgetown southeast about 20 miles to West Union, and surveyors are now running a line. The present road extends from Cincinnati southeast 42 miles to Georgetown. E. W. White, Cincinnati, is Vice-President and General Manager.

Coast Railway of Nova Scotia.—Thirty-one miles of this company's road, from Yarmouth east, to East Pubnico, N. S., are now completed and trains are running. Work is being actively prosecuted on the 20 miles between East Pubnico and Barrington, and it is expected to have that portion ready for operation by June 30 next. Right of way has been obtained from East Pubnico to the Clyde River, and a re-location of the line will be shortly commenced from Clyde River to Shelburne. This line makes direct connection at Yarmouth with the Yarmouth Steamship Co., of Boston. As projected, the line is to extend from Yarmouth around the southern end of the peninsula to Lockport. (See this column for Aug. 30.) L. H. Wheaton, Yarmouth, N. S., is Superintendent.

Columbia & Western.—The new extension from Trail, B. C., northwest 22 miles to Robson (see this column for July 16) has been completed by the contractors, Messrs. Winters, Parsons & Boomer, of Butte, and turned over to the company. With this addition the road now extends from Roslin northeast 36 miles to Robson. The company has a charter to make a further extension westward, from Roslin to Peucticon.

Dakota, Wyoming & Missouri.—Complete plans were filed in the United States Land Office at Rapid City, S. Dak., Oct. 14 for this road, which is projected to run from Rapid City west 30 miles to Mystic. The road was surveyed and graded nearly the entire distance several years ago, but the work was stopped for lack of money. W. T. Coad, Rapid City, is President.

El Paso & Northeastern.—This company has been incorporated in New Mexico with a capital stock of \$2,700,000, to build a railroad from El Paso, Tex., northeast, 165 miles, through New Mexico to White Oaks and the Salida coalfields. This company represents the same road as the El Paso & White Oaks, incorporated in New Mexico in September (see this column for Sept. 24). The directors are: Charles B. Eddy and W. A. Hawkins, of New Mexico; John A. Eddy, of Colorado; C. D. Simpson and H. D. Simpson, of Scranton, Pa.; B. C. W. Lowery and B. S. Harmon, of New York. The officers are: C. B. Eddy, President; C. D. Simpson, Vice-President; H. D. Simpson, Treasurer; B. S. Harmon, Secretary; John A. Eddy, in charge of construction.

The New Mexico Railway & Coal Co., an adjunct of this railroad company, was incorporated at the same time in New Mexico with a capital stock of \$4,000,000, having the same Board of Directors.

Erie & Central New York.—It is reported that the grading has been completed for six miles beyond Solon, N. Y., from Cortlandt, and all is ready for the ties and rails. Two miles remain to be graded and a few trestles are yet to be built. Fences and telephone poles have been erected nearly to Solon. The road as projected is to extend from Cortlandt, southeast through McGrawville, Solon and Freetown to Cincinnati, 16½ miles (see this column for Aug. 27). W. D. Tidsdale, Cortlandt, N. Y., is President.

Georgia Pine.—Track has been laid for 20 miles from Bainbridge, Ga., north to Colquit and grading has been completed for two miles beyond. Regular train service is in operation between Bainbridge and Colquit. Seventy-five men are at work on the extension, which is planned to go to Arlington, in all 39 miles. (See this column for July 16.) R. B. Coleman, Bainbridge, Ga., is General Manager.

Great Northern.—The Eastern Minnesota Division of this company has filed in the office of the Minnesota Secretary of State the declaration of intention to build and operate a branch line from a point on the Great Northern near Saunders, Wis., just south of West Superior, running northeast 230 miles up the St. Louis River through Cloquet, and north of Leech Lake to Fosston, Minn. This is the proposed connection between the Fosston Branch and Duluth referred to in this column last week. It is reported that work will begin on the new line at an early day, and that it will be completed as early as possible in 1898. Work has already begun under contractors A. Guthrie & Co., of St. Paul, for the cutoff branch near Saunders.

Houston, East & West Texas.—This company is relaying 115 miles with 60-lb. rails, distributed as follows: From mile post 125, just above Lufkin, Tex., to Logansport, 75 miles; on the Houston & Shreveport Division from Logansport to Shreveport, 40 miles. This will complete the 60-lb. rails for the entire track between Houston & Shreveport. (See this column for Sept. 10.)

Kickapoo Valley & Northern.—The extension of this road from Readstown, Wis., northeast 12½ miles, to La Farge (see this column for July 16), has been completed and trains are running. This completes 51 miles of road from Wauzeka to La Farge. The heaviest grades are one per cent., maximum curvature 10 deg. There is one tunnel 430 ft. long, and eight steel bridges of 60 ft. girders. E. A. Wadhams, Milwaukee, Wis., is Receiver.

Lehigh Valley.—Plans have been drawn and surveys made for building a branch from Cayuga, N. Y., east about 10 miles to Auburn. The company is now building a branch from Seneca Falls west to Geneva Junction, eight miles. (See this column for Oct. 1.) When a bridge is built across the upper end of Cayuga Lake, and the connection completed between Seneca Falls and Cayuga, the Lehigh Valley will have a direct line between Auburn and Buffalo.

Mansfield Short Line.—Under this title the Northwestern Monroe, to be run from Lucas, O., northeast to Mansfield, and the Richland, to be run from Mansfield northeast to Shelby, O., all in the county of Richland, are to be consolidated, with a capital stock of \$60,000. This is the same company that was incorporated in Ohio in September to build a road from Lucas, through Mansfield, to Shelby, about 20 miles. (See this column for Sept. 20.) E. H. Zurhorst, Sandusky, O., is Secretary.

Milwaukee & Superior.—Nine miles of track have been laid from Sussex, Wis., west to North Lake, and trains are running the whole distance, though the track is still unballasted. The road now runs from North Lake, east 36 miles to Milwaukee. (See this column for May 21.) Fifty men, one steam shovel and two gravel trains are at work building and the bridges and trestles are nearly completed. Contracts were let last spring to Bracey, Townsend & Co., requiring the completion of the work by Aug. 1, but the contractors after doing some work, failed to keep their contract and abandoned the work, which is now being finished by the railroad company. Stations are built at Merton and North Lake; telegraph wires are up and fencing is about two-thirds done. At North Lake ice-houses have been erected and stocked with ice. Winfield Smith, Milwaukee, Wis., is President, and William Powrie, Waukesha, Wis., is Chief Engineer.

Minneapolis-Anoka Suburban Railway.—This company was incorporated in Minneapolis Oct. 13, with a capital of \$100,000, to build a line from Anoka southeast 20 miles to Minneapolis. The incorporators are Geo. D. Bartlett, J. H. Niles, J. C. Engel, W. R. Gillis, C. E. Burnett, A. R. Woodmansee, I. A. Caswell, Henry Lee and T. G. McLean. The first officers are: President, Geo. D. Bartlett; Vice-President, T. G. McLean; Secretary, J. C. H. Engel; Treasurer, C. E. Burnett. All the incorporators and officers are of Anoka.

Mississippi Valley.—This company has put a force of men at work to complete the grading between Chester, Ill., and Grand Tower, about 30 miles. The road as projected is to extend from East St. Louis, Ill., southeast down the Mississippi to Cairo, about 135 miles. As it will follow the river the grade is light.

Missouri & Iowa Southern Railway.—This company was incorporated in Missouri, Oct. 19, with a capital stock of \$700,000 to build a road from Sedalia, Pettis County, north 50 miles to Miami, a point on the Wabash. Among the incorporators are: A. L. Strang, S. C. Gold and James Humphrey.

Mobile, Jackson & Kansas City.—Four hundred men are now at work on the second section of 23 miles from Dog River to Pascagoula River and building is going forward rapidly. (See this column for Aug. 27.) This section was let to C. D. Smith & Co., of Birmingham, Ala. Contracts will be let shortly from Pascagoula River northeast to Hattiesburg, Miss., 40 miles. The first 30 miles to Dog River are now being operated. There is a steel bridge to be built over the Pascagoula River and another over Dog River. There are many trestles to be built, one 1,200 ft. long. The projected road runs from Mobile, Ala., northwest 200 miles to Jackson, Miss. H. H. Lane, Mobile, Ala., is acting General Superintendent, and R. F. Ezzell, Chief Engineer.

Montana Central.—A contract has been let to Frank Lewis, of Belt, Mont., to build a branch in Cascade County, Mont., from Sand Coulee, 6½ miles, to the Cottonwood Coulee line and coalfields. It is stated that 250 men have been put at work in building.

North & South Mountain.—Under this title a company has been organized to build a road from Fort Steele, Carbon County, Wyo., on the Union Pacific, south about 200 miles into Colorado to connect with a point on the Colorado Midland. Among those interested are Col. Stephen Downey, of Wyoming, and J. C. Keller, of Denver, Col., nephew of Senator H. M. Keller.

Ohio River & Charleston.—The extension of this road from Blacksburg, S. C., southwest 10½ miles to Gaffney (see this column for Aug. 27), has been completed and trains are now running. This makes available valuable water power from the Broad River near Blacksburg, and connects the cotton mills at Cherokee Falls and at Gaffney with the main line.

Pembroke Southern.—Bids are invited by J. A. Thibodeau, Secretary, Pembroke, Ont., for the building of this road which is to extend from Pembroke, a point on the Canadian Pacific, southwest about 21 miles, to Golden Lake on the Canada Atlantic (see this column for Sept. 3). Wm. Russell, Jr., of Pembroke, is Chief Engineer.

Philadelphia & Reading.—Additional track on the Little Schuylkill Division of this road, from Tamaqua, Pa., south to Reynolds, 5.3 miles, has been completed, making the road double-track between these points.

Pittsburgh, Bessemer & Lake Erie.—Although the road is open for operation the business done is only limited as the company is waiting for the completion of the bridge across the Monongahela River. The old Shenandoah road is rebuilding, and is not yet in complete order. Meantime, the big steel cars, 100,000 lbs. capacity, are being used by the Pennsylvania Railroad.

Pittsburgh, Connellsville & Baltimore.—This company was incorporated in Pennsylvania, Oct. 25, with a capital stock of \$150,000 to build a line about nine miles long in Fayette County from a point on the Baltimore & Ohio and the Pennsylvania near Fairchance. The Officers and Directors are: President, R. E. Murdock, Ingram, Pa.; Treasurer, John G. Hosick, Springdale, Pa.; Directors, Charles W. Stoup, Mattona, Pa.; J. J. Gray, Selwyn N. Taylor, D. R. Gray, John O'Connell, J. H. Hillman, of Pittsburgh, and David Shaw, McKees Rocks, Pa.

Salt Lake & Los Angeles.—Contracts have been signed by the officers of this road and the Oregon Short Line, providing that the Salt Lake & Los Angeles is to take possession of the Utah & Nevada branch of the Oregon Short Line, which runs from Salt Lake City, Utah, southwest 37 miles to terminus and the property at Garfield Beach. In return the Salt Lake & Los Angeles is to give first mortgage bonds for \$300,000 and agrees to increase the gage to standard from Salt Lake City to Terminus and to extend the road from Terminus, south to Ophir, about 10 miles. It further agrees to build within two years a standard gage road from Tintic, a point on the Oregon Short Line, 50 miles south of Salt Lake City, to the Deep Creek Country, west about 100 miles. The Oregon Short Line furnishes rails, locomotives and equipment which it has on hand for the Utah & Nevada branch. N. W. Clayton, Salt Lake, is General Manager of the Salt Lake & Los Angeles.

Seaboard Air Line.—After a conference last week between General Manager St. John, of this company, and Presidents J. L. Orr and J. A. Smyth, of the Piedmont and Pelzer cotton mill companies, who represent a number of large mills in those towns of South Carolina, it was decided to build a branch from Abbeville, on the Seaboard Air Line, north 37 miles, to Pelzer and Piedmont. The mill men were assured that the road would be built as speedily as possible.

Southeastern & Atlantic.—This company is being

organized to build a belt line around Norfolk & Portsmouth, Va. Stock in the company is owned by the New York, Philadelphia & Norfolk, Seaboard Air Line, Chesapeake & Ohio, Atlantic & Danville, Norfolk & Carolina, Southern and Norfolk & Southern, all of which will be connected by the new line. A. J. Cassatt, of Philadelphia, is President, and Joseph U. Crawford Chief Engineer. It is reported that work has been begun and that the entire cost of building will be \$500,000.

Southern.—The Alabama Great Southern division has been relaying 25 miles of track from Wauhatchie, Tenn., southwest to Fort Payne, Ala., with 2,500 tons of new rails. (See this column for Aug. 6.)

Springfield, Little Rock & Gulf.—Shareholders of this company at a meeting held at Little Rock, Ark., Oct. 21, authorized its President to issue first mortgage bonds to build and equip 700 miles of line under the Smith land grant bill passed by the last legislature. (See this column for July 2.) The provisions of that bill are that the company receive a thousand acres per mile of Arkansas state lands on the main line, limited to counties laying within 50 miles of the railroad. Work must be begun before Dec. 26. John A. Hinsey, of Chicago, is President, and John B. Jones, of Little Rock, Ark., is Secretary.

Tennessee Northern.—Grading has been completed for 13 miles between Cumberland Junction, Tenn., a point on the Southern, and Warren, two miles north of La Follette, and track has been laid and ballasted the entire distance. Train service is in operation between Cumberland Junction and La Follette. (See this column for Oct. 1.) J. K. Sroufe, of La Follette, Tenn., is Chief Engineer.

Toledo & Northwestern.—This company has been incorporated in Michigan with a capital stock of \$200,000 to build a railroad from Albion north about 25 miles to Charlotte, both points on the Michigan Central. It is reported that work has been begun at Charlotte.

Union Pacific.—Preliminary surveys have been made for a contemplated reduction in the mileage of this road in Wyoming from Cooper Lake in Albany County to Percy in Carbon County (see this column for Sept. 3). By the proposed re-location the main line would be shortened about 20 miles. The stations of Medicine Bow, Carbon and Rock Creek would be cut off.

Washington, St. Mary's Bay & Point Lookout.—Contracts have been let for building the first 18 miles of this line from Mechanicsville (see this column for Sept. 29). The road is to extend from Washington, D. C., southeast to Point Lookout, Md. Col. A. B. Linderman, of Philadelphia, is President.

Washington, Westminster & Gettysburg.—Notice is given of the intention of this company to make application to the Governor of Pennsylvania on Nov. 13 for a charter for the Pennsylvania end of this proposed road from Gettysburg south about 75 miles through Littlestown, Pa., Union Mills, Westminster, Mt. Airy, Damascus, Etchinson, Laytonsville, Washington Grove and Rockville to Washington, D. C. (See this column for Oct. 8.) The incorporators are: J. B. Colegrove, C. F. Frothingham, A. G. Denniston, Charles H. Duttera, John A. Shorb and Solomon D. Mehring, of Littlestown; John A. Hughes, Samuel M. Bushman, C. A. Trostle, David G. Minter, Amos J. Collins and Jacob F. Weybright, of Gettysburg.

Wyoming & North Western.—Articles of incorporation have been filed at Cheyenne, Wyo., for a line from Casper, the present terminus of the Fremont, Elkhorn & Missouri Valley, west about 300 miles along the Wind River through Natrona, Fremont and Uinta counties to the western border of Wyoming. It is reported that some 60 miles of this road will be built at once from Casper west. The capital stock is \$6,000,000; principal office, Casper. The incorporators are Thos. S. Moffat, Reuben Hatch and Thos. J. Brown, all of Chicago.

Electric Railroad Construction.

Amherst, Mass.—The Northampton & Amherst Electric Railway Co. has petitioned the Selectmen of Amherst and Hadley, Mass., for franchises to build its projected electric road through those towns. The Amherst & Sunderland Electric Railway Co. has also petitioned for permission to build over the same route.

Binghamton, N. Y.—A committee appointed to investigate the desirability of building an electric road from Otselic Valley to Binghamton has reported in favor of its construction, which, as proposed, will be 46 miles in length and cost about \$800,000.

Brookfield, Mass.—The town of Brookfield at a special meeting last week voted to grant a franchise to the Warren, Spencer & Brookfield Electric Railroad to lay a track in the highway from East Brookfield to the North Brookfield line. There was considerable opposition, a considerable element desiring to have the branch leave the main line at Brookfield instead of East Brookfield. The line granted lies parallel to the North Brookfield Branch of the Boston & Albany.

Buffalo.—The Grade Crossing Commissioners have decided to grant the request of the Buffalo Traction Co. to cross the tracks of the Lehigh Valley and Erie railroads at grade, using proper derailling devices to avoid accidents at the crossings.

Denver, Col.—The Pueblo Chieftain states that the Denver & South Park Railroad has filed articles of incorporation and sufficient money has been subscribed to build a road from Denver to Fairplay.

Flint, Mich.—The right of way for an electric road between Flint and Pontiac has been secured. Joseph Sawyer, of Pontiac, and George E. Taylor, of Flint, are among the promoters.

Hamilton, O.—The Hamilton, Venice & Okena Electric Street Railroad Co. has filed articles of incorporation, the incorporators including O. V. Davis, W. C. Shepherd and E. Mueller. The capital stock is \$10,000, and the headquarters will be at Hamilton, Butler County.

Our correspondent informs us that President Myles of the Hamilton, Grimsby & Beamsville Electric Railway, has succeeded in raising the sum of \$200,000 to build an electric line from Beamsville to St. Catharines.

A large amount of the stock required for the construction of the Hamilton, Chedoke & Ancaster Electric Railway has been subscribed, and it is hoped to commence work at an early date.

The Hamilton Electric Power & Manufacturing Co. has applied for the franchise to build an electric road on the city streets.

La Porte, Ind.—It is proposed to build an electric

road to connect Goshen, Ind., with Danville, Ill., and it is stated that two routes have been surveyed.

Mason, Mich.—The Agricultural College of Mason, Mich., has, according to reports, been granted a franchise to build a short electric line to connect with the present electric road at Lansing.

Mt. Healthy, O.—Albert B. Donn, Village Clerk of Mt. Healthy, will give information regarding the construction of a street railroad over route No. 1, bids for which have been asked for Nov. 3.

New Britain, Conn.—A petition is being circulated in East Berlin and vicinity asking the Central Railway & Electric Co., of New Britain, Conn., to extend its line from Berlin to East Berlin, as provided in the charter granted by the last legislature.

Old Point Comfort, Va.—A new company recently organized to build an electric road from Hampton and Newport News to Old Point Comfort is making preliminary preparations so as to begin the work as soon as the charter is granted.

Pekin, Ill.—The Peoria & Pekin Traction Co., which is building a road between the places mentioned in the title, has purchased from the Pekin Improvement Co., a site on which it proposes to build a Union station. If arrangements can be made with the Chicago, St. Louis & Peoria, the Cleveland, Cincinnati, Chicago & St. Louis and the Peoria, Decatur & Evansville railroads, these steam lines will pass into the city over the new tracks to be placed by the Traction Company and use the proposed Union station as a terminus.

Philadelphia.—Resolutions granting permission for an extension of the lines of the Union Traction Co. in the first ward and also for that road to remove one of its tracks in East Susquehanna avenue have been referred by the City Passenger Railway Committee of the City Council to sub committees.

Rockville, Conn.—The new electric road from Manchester to Rockville will be ready to open for travel in about two weeks. R. W. Hildreth & Co., of New York, are the contractors and Wm. H. Olmstead of East Hartford, is the Civil Engineer.

Shenandoah, Pa.—The Shenandoah Street Railway Co. has been granted a charter to build an electric road from Shenandoah to Ringtown. The capital stock is placed at \$100,000.

Somerville, N. J.—The New York & Philadelphia Traction Co., which has met opposition in building its line from Somerville to Bound Brook, placed 800 laborers at work on Sunday morning and completed three miles of track and had cars running before the close of the day. An injunction was served early Sunday morning, but the Superintendent refused to regard it on the ground that no courts were open on Sunday and that the Traction Co. could not be enjoined by law before Monday.

Tamaqua, Pa.—The Tamaqua & Langsford Street Railway Co. has completed the tracks which connect Tamaqua and Summit Hill with the towns in Panther Creek Valley.

Warren, Pa.—Work is being pushed on the branch connecting North Warren with the main line of the Warren Street Railway Company. When completed the cars will be run between North Warren and West End.

Waynesboro, Pa.—Articles of association have been signed by the stockholders of the Blue Ridge Electric Railway Co. The capital stock has been placed at \$50,000 and the application for a charter will be forwarded to the State Department at Harrisburg very soon. It is proposed to build the road early in the spring.

Wilmington, Del.—The Newport, New Castle & Wilmington Railway Co. has completed its organization by the election of Thomas Holcom, of New Castle, Del., as President, and J. A. Cranston, of Newport, Del., Secretary. The company will build an electric road from Newport to Wilmington, through New Castle.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The earnings for September and for the three months ended Sept. 30 were as follows:

September:	1897.	1896.	Inc or Dec.
Average mileage.....	6,934.96	6,890.76	I. 44.20
Gross earn.....	\$3,423,213	\$2,911,546	I. \$511,667
Oper. expen.....	2,358,034	2,028,668	I. 329,366
Net earn.....	\$1,065,179	\$882,878	I. \$182,301
Taxes and rentals.....	140,915	181,317	D. 40,402
Income from oper....	\$924,264	\$701,561	I. \$222,703

Three months:	1897.	1896.	Inc or Dec.
Gross earn.....	\$9,232,026	\$7,954,445	I. \$1,277,581
Oper. expen.....	6,780,828	5,765,714	I. 1,015,094
Net earn.....	\$2,451,218	\$2,188,731	I. \$262,487
Taxes and rentals.....	422,620	535,517	D. 112,897
Income from oper....	\$2,028,598	\$1,653,214	I. \$375,384

Baltimore & Ohio.—The Receivers having given notice that the payment of the coupons of the Philadelphia branch 4½ per cent. sterling bonds, due 1903, will not be made when due, Oct. 1 (see this column for Oct. 1), Brown, Shipley & Co., London, have given notice that it is their intention to take immediate steps for the protection of the bondholders' interest. Holders are requested to deposit their bonds with that firm without delay.

The earnings for August and for the two months ended Aug. 31 were reported as follows.

August:	1897.	1896.	Inc.
Gross earn.....	\$2,371,830	\$2,298,356	\$73,474
Oper. expen.....	1,655,237	1,635,017	\$20,220
Net earn.....	\$716,593	\$663,339	\$53,254
Two months:	1897.	1896.	Inc.
Gross earn.....	\$4,554,286	\$4,486,654	\$67,632
Oper. expen.....	3,345,384	3,307,130	\$38,254
Net earn.....	\$1,208,902	\$1,179,524	\$29,378

Central of Georgia.—The earnings for September and for the three months ended Sept. 30, were as follows:

September:	1897.	1896.	Inc. or Dec.
Mileage.....	1,523.71	1,459.14	I. 64.57
Gross earn.....	\$500,086	\$488,614	I. \$11,472
Oper. expen. and taxes.....	303,911	308,449	D. 4,538
Net earn.....	\$196,275	\$180,165	I. \$16,110
Three Months:	1897.	1896.	Inc.
Gross earn.....	\$1,241,495	\$1,224,012	I. \$17,483
Oper. expen. and taxes.....	848,766	857,156	D. \$8,390
Net earn.....	\$392,729	\$366,856	I. \$25,873

Chicago & West Michigan.—Bondholders of this road have received the following notice from the Treasurer, dated Oct. 21: As the net earnings of the road will not admit of the payment of the full amount of the coupons due November 1 next of the Chicago & North Michigan Railroad Co.'s five per cent. bonds, the Directors have passed the following vote in reference thereto:

"Voted, That the Treasurer pay the holders of the coupons due November 1, 1897, of Chicago & North Michigan Railroad Co. five per cent. bonds, one-half the amount of same in cash and the other half in 10 year coupon scrip of the same form and on the same basis as that heretofore issued."

Chicago, Milwaukee & St. Paul.—Holders of the \$766,000 Prairie Du Chien 7.3 per cent. second mortgage bonds maturing Feb. 1, 1898, are notified that the last opportunity for converting these bonds into preferred stock at par will end Oct. 31.

Chicago, St. Louis & New Orleans.—Holders of seven per cent. currency bonds of this portion of the Illinois Central, due Nov. 1, 1897 (\$1,367,000 outstanding), are notified that they can exchange the same for five per cent. gold bonds of the Chicago, St. Louis & New Orleans, due 1951. The interest on these bonds has been reduced to 3½ per cent. The exchange will be made on this basis: For the old bonds with coupons maturing Nov. 1 will be given the new 3½ per cent. bonds at 98, with accrued interest from June 15 of \$13.22, and a cash payment to the holder of \$41.78. The new 3½ per cent. gold bonds are guaranteed by the Illinois Central Company.

Franklin & Megantic.—Sheriff Blake, of Strong, Me., at a public auction held at that place Oct. 25, sold the personal property of this company to satisfy an execution issued in favor of Weston L. Lewis, President of the Sandy River. The property was bought by Mr. Lewis. The road extends from Strong to Kingfield, Me.

Grand Trunk.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

	1897.	1896.	Inc. or Dec.
Gross earn.....	\$1,712,578	\$1,614,222	I. \$98,356
Oper. expen.....	1,130,661	1,153,555	D. 22,894
Net earn.....	\$581,917	\$460,667	I. \$121,250
Two months:			
Gross earn.....	\$3,370,176	\$3,230,235	I. \$139,941
Oper. expen.....	2,220,533	2,301,766	D. 81,233
Net earn.....	\$1,149,643	\$928,469	I. \$221,174

New England.—The earnings for the quarter ended Sept. 30 were reported to the New York State Commissioners as follows:

	1897.	1896.	Inc.
Gross earn.....	\$1,633,275	\$1,556,721	\$76,554
Oper. expen.....	1,189,691	1,106,892	82,799
Net earn.....	\$443,584	\$449,829	\$6,245
Other income.....	8,293	6,113	2,180
Total income.....	\$451,877	\$455,942	\$4,065
Charges.....	398,238	388,738	9,500
Surplus.....	\$55,639	\$167,204	\$111,565

Northern Central.—The earnings for September and for the nine months ended Sept. 30 were as follows:

	1897.	1896.	Inc. or Dec.
Gross earn.....	\$676,255	\$594,118	I. \$82,137
Oper. expen.....	422,301	394,062	I. 28,239
Net earn.....	\$253,954	\$199,056	I. \$54,898
Nine months:			
Gross earn.....	\$1,885,441	\$1,559,335	I. \$326,106
Oper. expen.....	3,404,352	3,416,914	D. 12,562
Net earn.....	\$1,481,089	\$1,142,421	I. \$338,668

Northern Pacific.—The earnings for September and for the three months ended Sept. 30, 1897, were reported as follows:

	September.	Three months.
Gross earn.....	\$2,510,839	\$6,179,760
Oper. expen.....	1,094,855	3,233,468
Net earn.....	\$1,415,984	\$2,946,292
Taxes.....	42,900	128,700
Net operating income.....	\$1,373,084	\$2,817,592
Miscellaneous income, not including land sales.....	5,243	10,777
Total net income.....	\$1,378,327	\$2,828,369

Oregon Railroad & Navigation.—The earnings for August and for the two months ended Aug. 31 were reported as follows:

	1897.	1896.	Inc.
Gross earn.....	\$568,075	\$314,170	\$253,905
Oper. expen.....	219,228	236,338	62,890
Net earn.....	\$348,847	\$77,832	\$271,015
Two Months:			
Gross earn.....	\$2,975,693	\$2,651,503	\$324,190
Oper. expen.....	1,874,135	1,874,135	0
Net earn.....	\$1,101,558	\$777,368	\$324,190

St. Louis & Kansas City.—Judge Taft in the U. S. Court at Toledo, O., has filed an order appointing Irvin Belford Special Master, with instructions to give 30 days' notice to the creditors of this road requesting them to file their claims before the Special Master prior to Dec. 1. Those failing to comply with the order will be excluded from participation in the distribution of the company's assets. This decision came in the case of the petitions of Jules Bache and others.

Southern.—The earnings for September and for the three months ended Sept. 30 were as follows:

	1897.	1896.	Inc.
Mileage.....	4,872.22	4,776.63	95.59
Gross earn.....	\$1,802,234	\$1,602,234	\$199,999
Oper. expen. and taxes.....	1,166,801	1,087,577	79,224
Net earn.....	\$635,433	\$514,657	\$120,776
Three months:			
Gross earn.....	\$1,890,363	\$1,557,910	\$332,453
Oper. expen. and taxes.....	3,107,114	3,204,169	96,055
Net earn.....	\$1,483,249	\$1,353,741	\$129,508

Union Pacific.—On Monday, Oct. 25, U. S. Attorney General McKenna announced that the government would ask for a postponement of the foreclosure sales of the Union Pacific and Kansas Pacific to Dec. 15. Thereupon the Union Pacific Reorganization Committee issued the following statement:

"The Attorney General has notified this committee that he proposes to ask the court for an adjournment of the foreclosure sales of the Union Pacific and Kansas Pacific Railway properties to Dec. 15, so as to postpone final disposition until after Congress shall have met. This action is no doubt taken to free the Administration from embarrassment.

"The Reorganization Committee has, however, reached the conclusion that the interests of the security holders represented by it, and of the syndicate furnishing the funds to finance the reorganization, demand reorganization without any further delay. In this situation the committee contemplates, so as to gain prompt possession of the Union Pacific Line, to oppose any adjournment of the sale of the main line, and to bid it in, if need be, for the full amount of the Government's claim, the additional sum involved in this being about \$8,000,000.

"As to the Kansas lines, the foreclosure of the first liens upon the subsidized divisions of the Kansas Pacific Railway will be energetically pressed, and when these foreclosures shall have been accomplished, the reorganization of the Kansas lines will be completed as planned.

"Allotments made under the plan to Kansas Pacific security holders and amounting to about \$15,000,000 in new bonds and \$20,000,000 in preferred stock will remain reserved for the reorganization of the Kansas lines.

"The amount of new first mortgage bonds to be issued for the purpose of the reorganization of the Union Pacific main line will not exceed \$70,000,000, and of preferred stock \$55,000,000.

"No change in the plan of reorganization is involved in the foregoing."

This increase of the bid by the Reorganization Committee to cover in full the indebtedness to the government on the Union Pacific main line has led the Attorney-General to withdraw all opposition to the sale of that portion of the road, and it will take place as advertised. The sale of the Kansas Pacific has been postponed to Dec. 15. On this portion of the system the second mortgage lien of the government is on the Kansas division only, and on July 1 was: Principal, \$6,303,000; interest, \$6,571,115; total, \$12,874,115. The division extends from Kansas City, Mo., west through Kansas 394 miles. The sale of the various lines as originally advertised, with the upset price deposits, etc., is as follows:

Mortgage.	Date.	Place.	Upset price.	Depo. it.
Government subsidy.....	Nov. 1	Omaha	\$23,000,000	\$2,600,000
Sink fund.....	Nov. 1	Omaha	18,645,250	1,364,525
Union Pacific 1st.....	Nov. 2	Omaha	50,637,435	2,900,000
Kansas Pacific 1st.....	Nov. 3	Topeka	8,500,000	500,000
Kansas Pacific Govt. sub.....	Nov. 4	Topeka	2,500,000	500,000
Kansas Pacific East.....	Nov. 5	Topeka	4,500,000	200,000
Kansas Pacific Mid.....	Nov. 6	Salina	5,300,000	200,000
Denver Pacific 1st.....	Nov. 8	Denver	2,000,000	500,000

Electric Railroad News.

Baltimore, Md.—Negotiations which have been in progress for some time for the sale of the Columbia & Maryland Railway to a syndicate of Baltimore capitalists have been completed. It is the purpose of the new owners, who include a number of the original projectors, to complete the line as an electrical railroad. It is estimated that the work already done represents an outlay of about \$1,000,000. The price paid by the new owners of the property is said to be considerably less than this amount. It is understood that the whole property is in shape for speedy completion of the original plans.

Boston, Mass.—On Tuesday the Massachusetts Railroad Commissioners gave a hearing to the representatives of the street railroad companies in all the large cities on the subject of vestibule cars. The law enacted by the Legislature of the present year provides that after Jan. 1 all new cars put on by any street railroads in cities and towns with a population of less than 50,000 shall be vestibuled, and that in the large cities vestibule cars may be used if the Commission does not rule them against public interest and safety. The only road indorsing vestibule cars, at the hearing last Tuesday, was the Springfield Street Railway Co. The representatives of the Union Street Railway Co., New Bedford; Globe Street Railway Co., of Fall River; the Worcester & Suburban, Lowell & Suburban, Lowell, Lawrence & Haverhill, and West End roads, all opposed them on the ground that they impaired seeing and hearing on the part of the motormen. It was stated that the West End motormen did not want them. Vice-President Cummings, of this company, representing the combined interests of the opposing companies stated that they would be satisfied if the Commissioners rendered no decision on the matter, but left each road in large cities to decide for themselves.

Chicago.—Receiver McAllister, of the Metropolitan Elevated Railway Co., has been ordered to pay \$50,196 to the Central Trust Co. and to the Guaranty Trust Co., both of New York, which amount is the balance due of the semi-annual interest on the \$10,000,000 bonds given to the West Side Construction Co.

A stockholders' bill recently issued by ex-Judge S. P. McConnell asks for the appointment of a Receiver for the General Electric Railway Co., an injunction preventing the sale of any more of the bonds and a general accounting. It is alleged that the resources are being used for other purposes than in the interests of the company. An agreement has been reached whereby the application for a Receiver has been postponed until Nov. 2.

Cleveland, O.—Mr. C. F. Emery, one of the stockholders and a director of the Littleton Consolidated Street Railway Co., has made an affidavit in the case of Frank De Hass Robinson against the road, in which Mr. Robinson is charged with indebtedness to the stockholders of the company of over \$1,600,000.

Detroit, Mich.—The Detroit, Lake Shore & Mt. Clemens Railway Co., which is building a road from Detroit to Mt. Clemens, has met with another setback. A temporary order has been issued to restrain it from building along a highway known as Grosepointe Road, and the petitioner has asked that the injunction be made permanent.

Greenbush, N. Y.—The Greenbush & Nassau Railway Co. has increased its capital stock from \$180,000 to \$325,000 and has decided to push the work on the road between East Greenbush and Rensselaer as soon as surveys can be made. The right of way is being secured.

Madison, Wis.—Mr. Frank W. Oakley, Receiver of the Madison City Railway Co., informs us that on petition of the New York Guaranty & Indemnity Co., the Madison Street Railroad will be sold to the highest bidder on Dec. 1. The New York company holds outstanding bonds aggregating \$150,000 and the amount due Oct. 1 for principal and interest is more than \$174,000. The Street Railroad Co. has been in the hands of a Receiver since March, 1896, and since that time has made improvements aggregating some \$30,000.

New York.—An order has been obtained from Justice Traux in the Supreme Court calling on the Metropoli-

tan Street Railway Co. to show cause why an injunction should not be issued which will prevent further work on the tracks of the electric conduit line on Amsterdam avenue. It is understood that the company will enter a general denial of the charges that have been brought against it, asserting that the Department of Public Works had the right to grant the privilege of laying the tracks and that the consent of the majority of the stockholders was secured.

San Jose, Cal.—The stockholders of the San Jose & Santa Clara Street Railway Co. have authorized a bonded indebtedness of \$200,000 for the purpose of paying off existing bonds. The new issue will be for 15 years at 6 per cent.

Terre Haute, Ind.—The Terre Haute Electric Street Railway Co. was placed in the hands of a Receiver on Oct. 18. The receivership was the result of a levy on the property of the company by the City Treasurer of Terre Haute for \$5,000 delinquent taxes.

TRAFFIC.

Traffic Notes.

The Lehigh Valley now sells mileage tickets without any time limit.

Kansas City factories have recently shipped 750 tons of canned beef to Japan for the army and navy of that country, sending it over the Chicago Great Western and the Canadian Pacific.

The Tennessee Coal, Iron & Railroad Co. has sold 100,000 tons of coal to Vera Cruz, Mex., for railroad use, the coal to be shipped during the next 12 months. It will go over the Louisville & Nashville to Pensacola, Fla.

A Kansas City paper states that the elevator companies of that city, after strenuous opposition, long kept up, have decided to pay demurrage on freight cars, as demanded by the Kansas City Car Service Association.

A press dispatch from Detroit says that Governor Pingree, of Michigan, will bring suit for a mandamus to compel the Michigan Central and the Lake Shore & Michigan Southern to sell family mileage tickets good for two years, at \$20 for 1,000 miles. The Supreme Court of Michigan has recently sustained the law requiring this, but the two roads named claim that the provisions of their charters exempt them from compliance with the law.

The Supreme Court of Minnesota has reversed the decision of the Lower Court, in the Steenerson grain rate case, which has been pending for about four years. The Supreme Court holds that the establishment and regulation of rates is an executive function and that therefore the State Railroad Commission is competent to perform it. The newspaper report states that the decision holds the rates made by the Commission in 1894 to be reasonable, the evidence going to show that under them the railroads could earn five per cent. on the value of their lines and 2½ per cent. on the value of terminal property.

Chicago Traffic Matters.

CHICAGO, Oct. 27, 1897.

In the 1898 pass agreement of the Western lines it is proposed to further restrict personal, political and charitable courtesies. The Western Passenger Association complains that the effectiveness of its clergy bureau has been weakened by the extravagant manner in which free transportation has been furnished to agents and officers of religious, reform and charitable organizations, and the coming year it is proposed to give these people no better than half rates.

The Baltimore & Ohio and the Baltimore & Ohio Southwestern are threatening to withdraw from the Central Passenger mileage bureau unless the Joint Passenger Committee grants permission for the interterritorial use of the interchangeable mileage ticket.

The Union Pacific has finally settled its dispute with the Oregon Railway & Navigation Company, and has notified all its Eastern connections that it will now resume the sale of one way and round trip tickets over that line.

The Hay Receivers' Association of Chicago has filed a complaint with the Interstate Commerce Commission, charging that the Eastern Illinois, the Panhandle, the Erie, the Wabash, the Monon, the Lake Shore and the Michigan Central are discriminating against hay dealers in applying demurrage and storage charges.

Lake and rail rates on flour and grain to the Atlantic seaboard probably will not be advanced before the close of navigation. The Soo refuses to make the agreed advance unless it has assurances that no contracts have been made by lines via Chicago extending beyond the date of the agreed advance.

Several hundred unauthorized tariffs, mostly on commodities have been cancelled by the Commissioners of the Western Joint Traffic.

The Executive Committee of the Western Passenger Association has recommended that harvest excursion rates be authorized for November and December.

The State Railroad Commissioners have summoned all the Illinois roads to appear before them and show cause why they refuse to apply the rate prescribed by the Commissioners on logs.

Chairman Caldwell says that the Western lines will not begin using the new Sebastian interchangeable ticket until Nov. 15. The details have not been perfected.

During October the average daily sales of the Central Passenger interchangeable mileage ticket have been 385. Eastbound shipments from Chicago and Chicago junctions to points at and beyond the Western terminal of the trunk lines for the week ending Oct. 21 amounted to 64,397 tons, as compared with 60,107 tons the preceding week. This statement includes 26,377 tons of grain, 3,108 tons of flour and 10,995 tons of provisions, but not live stock. The following is the statement in detail for the two weeks:

Roads.	WEEK ENDING OCT. 21.		WEEK ENDING OCT. 14.	
	Tons.	p. c.	Tons.	p. c.
Baltimore & Ohio.....	3,598	5.6	4,307	7.2
C. & C. & St. Louis.....	4,494	7.0	3,348	5.6
Erie.....	9,644	15.0	7,842	13.1
Grand Trunk.....	8,208	12.8	6,987	11.6
L. S. & M. S.....	7,649	11.9	6,680	11.1
Michigan Central.....	6,339	9.8	8,060	13.4
N. Y., Chi. & St. L.....	5,020	7.8	5,094	8.5
Pitts., Cin. & St. Louis.....	4,492	7.0	4,527	7.5
Pitts., Ft. Wayne & Chicago.....	8,213	12.8	7,478	12.4
Wabash.....	6,620	10.3	5,774	9.6
Totals.....	164,277	100.0	160,107	100.0

Lake shipments last week were 176,367 tons.